Machine and Tool BLUE BOOK

ESTABLISHED 1906

MARCH 1951

Special Report on

Chucking Machines, Turret Lathes, Hand Screw Machines

How to Reduce Vibration

New Inspection Method for Castings

Contents on Page 5

Only MARVEL *builds all four* *

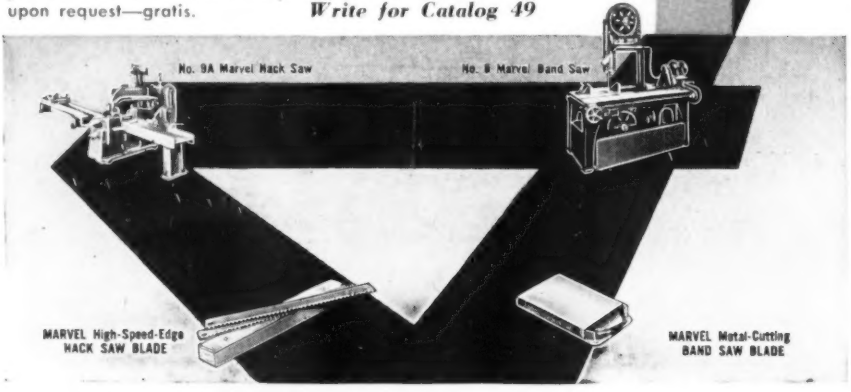
- *HACK SAWING MACHINES
- *BAND SAWING MACHINES
- *BAND SAW BLADES
- *HACK SAW BLADES

While it is true there are several builders of hack sawing machines and many builders of band sawing machines, only MARVEL builds *BOTH* hack saws and band saws. The fact is that MARVEL manufactures 35 models of 10 basic types of metal sawing machines which include the world's fastest automatic production saw, the world's largest giant hydraulic hack saws, the world's most versatile band saw and the most widely used small shop saws.

With intimate and broad field experience in all types of metal cutting-off equipment and 35 different saws available, it is obvious that MARVEL Field Engineers occupy a unique and exclusive position in the industry. They are eminently qualified to make expert and *unbiased* recommendations covering the type, size and model of metal sawing equipment best suited to individual requirements—the most efficient, most accurate, fastest, broadest in scope and the most economical.

MARVEL is also the only manufacturer of both metal sawing *machines* and metal sawing *blades*. Because the efficiencies of both the machine and the blades are interdependent, each upon the capability of the other, expert knowledge covering both saws and saw blades is essential to the proper appraisal of any specific sawing situation. Correct balance of cutting speed and blade life, feed pressure and blade tension are all potent factors in over-all performance. Here again it is the MARVEL Field Engineer who is qualified to provide the comprehensive answer to your question. His job is to help you saw metal most efficiently—his services are available upon request—gratis.

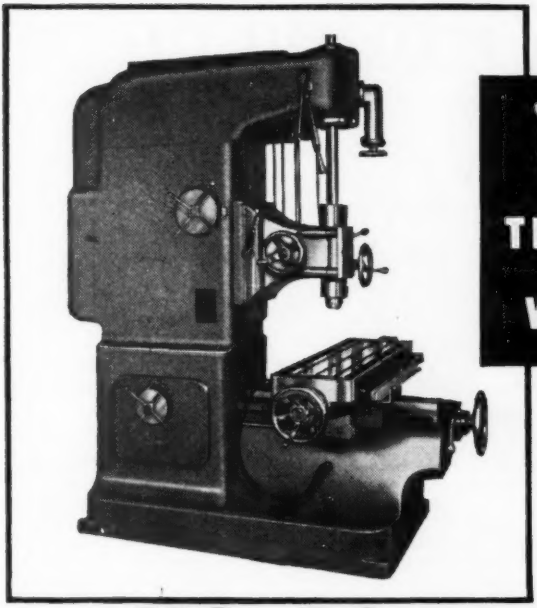
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MARVEL *Metal Cutting* SAWS

Marvel Machines · Marvel Blades

ARMSTRONG-BLUM MFG. CO.
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1 MACHINE THAT DOES THE WORK OF 2

Sixteen Spindle speeds, 40 to 2000 r.p.m.—9 Spindle feeds, .005" to .010"—100" rapid traverse per minute in both directions—16 Table feeds, ¾" to 20" per minute.

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✓ SAVES AT LEAST HALF THE SETUP TIME!
✓ ELIMINATES ALL WORK TRANSFERS
✓ SPEEDS UP OUTPUT—REDUCES UNIT COSTS

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ATTACH TO COMPANY LETTERHEAD

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3920 West Pine, St. Louis 8, Mo.
Send catalog on No. 50 and other Knight Milling Machines.

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TITLE .....

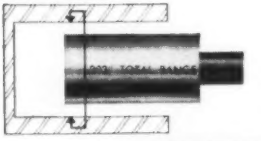
REMARKABLE STABILITY

.003" RANGE

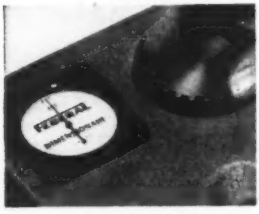


ACTUAL SIZE
9" x 7⅞" x 8½"
WEIGHT 17¼ LBS.

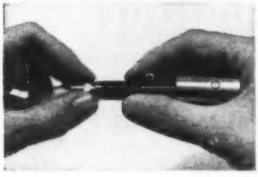
New FEDERAL Air Gage!
The DIMENSIONAIR!
Use it under oil or coolants!



Exceptional measuring range • Greater plug clearance • Jets can be at any position • Longer plug wear.



Outstanding stability • Quick, positive setting • No drift • No sticking.



Finger-tight connections for plug and hose. Non-corrosive vinylite hose.

OUTSTANDING PERFORMANCE describes what this new air gage can do — and that's no exaggeration!

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IT READS .00005" *directly*. Not a "go — no go" gage. Only *one* master required. Tolerances are set up on the dial directly just as on a Dial Indicator. Insert plug in hole with jets at *any position* — it makes no difference.

ANY PRESSURE FROM 40 to 100 POUNDS. Normal pressure fluctuations do not affect its accuracy. Smallest centralizing error of any air gage — so small other gages not even sensitive to it.

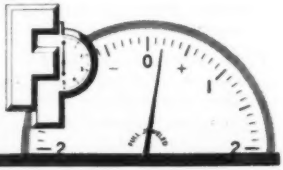
USE IT UNDER OIL OR COOLANTS. Greater jet pressure, larger orifices and *extra clearance* enable the plug to be used at production. Grit, dirt, and rough handling won't interfere or clog it.

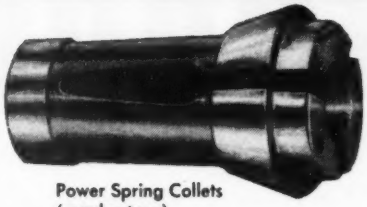
DEEPER RECESS CLEARANCE — chrome plated plugs — longer wear; finger-tight hose and plug connections; non-corrosive, vinylite plastic hose; and many other outstanding performance features make this Federal Dimensionair an air gage which will not only amaze you but will pay off in better, more positive gaging.

Those who already use it say it's way ahead. Write for a free demonstration. You owe it to yourself to see the Dimensionair. FEDERAL PRODUCTS CORPORATION, 1253 Eddy Street, Providence 1, Rhode Island.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES





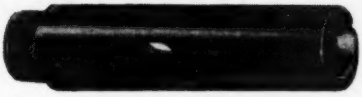
Power Spring Collets
(regular type)



Power Spring Collets
(taper nose type)



Feed Fingers (regular type)



Master Feed Fingers and Pads



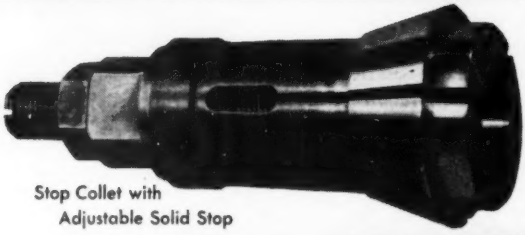
Master Feed Fingers
with Adjustable Tension

HARDINGE
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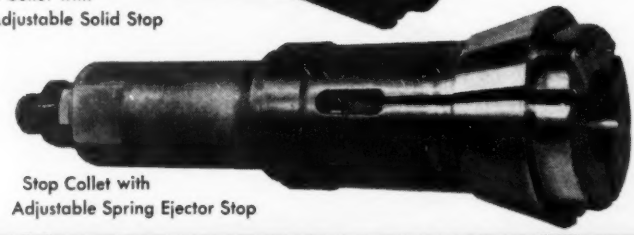
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Adjustable Solid Stop

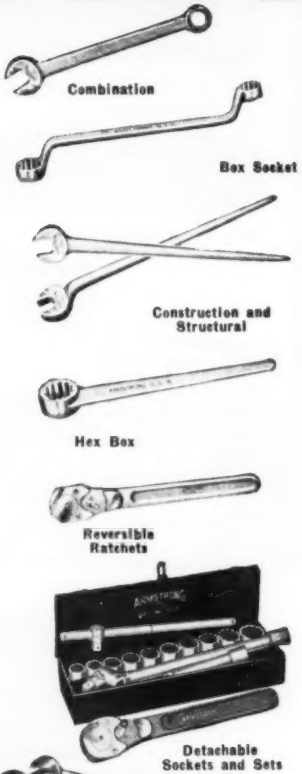


Stop Collet with
Adjustable Spring Ejector Stop

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"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

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Blue Book
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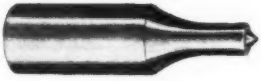
Every Size for EVERY NEED!



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FABRICATING TOOLS

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Established 1880

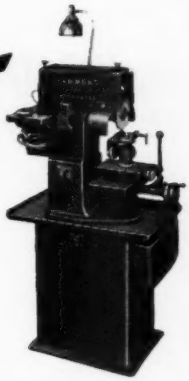
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Hammond

OF KALAMAZOO

CARBIDE TOOL AND CHIP BREAKER GRINDERS



CB-77 Chip Breaker and Diamond Finishing Grinder

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TIME

TOOLS

WHEELS



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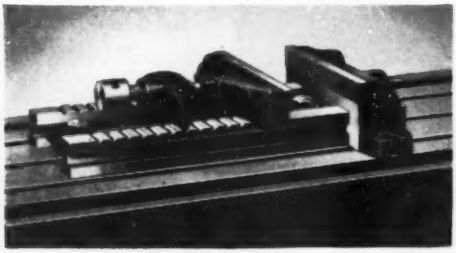
IT'S TIME TO STOP PLAYING GUESSING GAMES *in your shop*



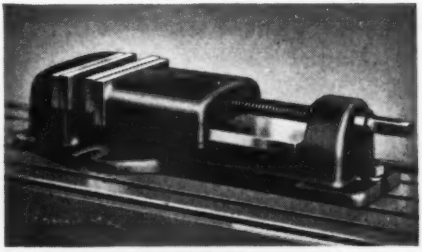
Guessing games are pastime for children; time wasters in your shop. And your high priced shop men do play guessing games when they try to find out who borrowed the No. 3 vise, the 1½" style B arbor, or the quick change adapter. Today, shop time is more valuable than ever before. You can make the most of it by equipping your milling machine operators with enough accessory equipment to eliminate their wandering around and trying to guess who borrowed what. Cincinnati Milling offers a wide variety of equipment for conventional milling machines. Some of it is illustrated here. Complete data and information on application will be found in literature. Write for the full set.

Cincinnati Milling Machine Accessory Literature: Toolmaker's Vise, M-988 • Plain and Swivel Vises, M-1665 • All-Steel Vise, M-1247 • Arbors and Accessories, M-1664.

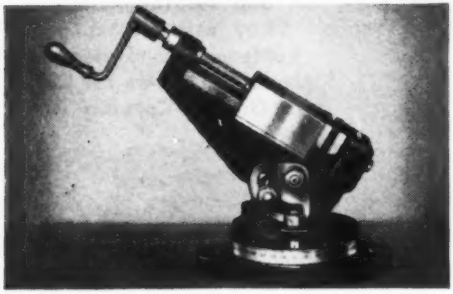
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All-Steel Vise



Plain Vise

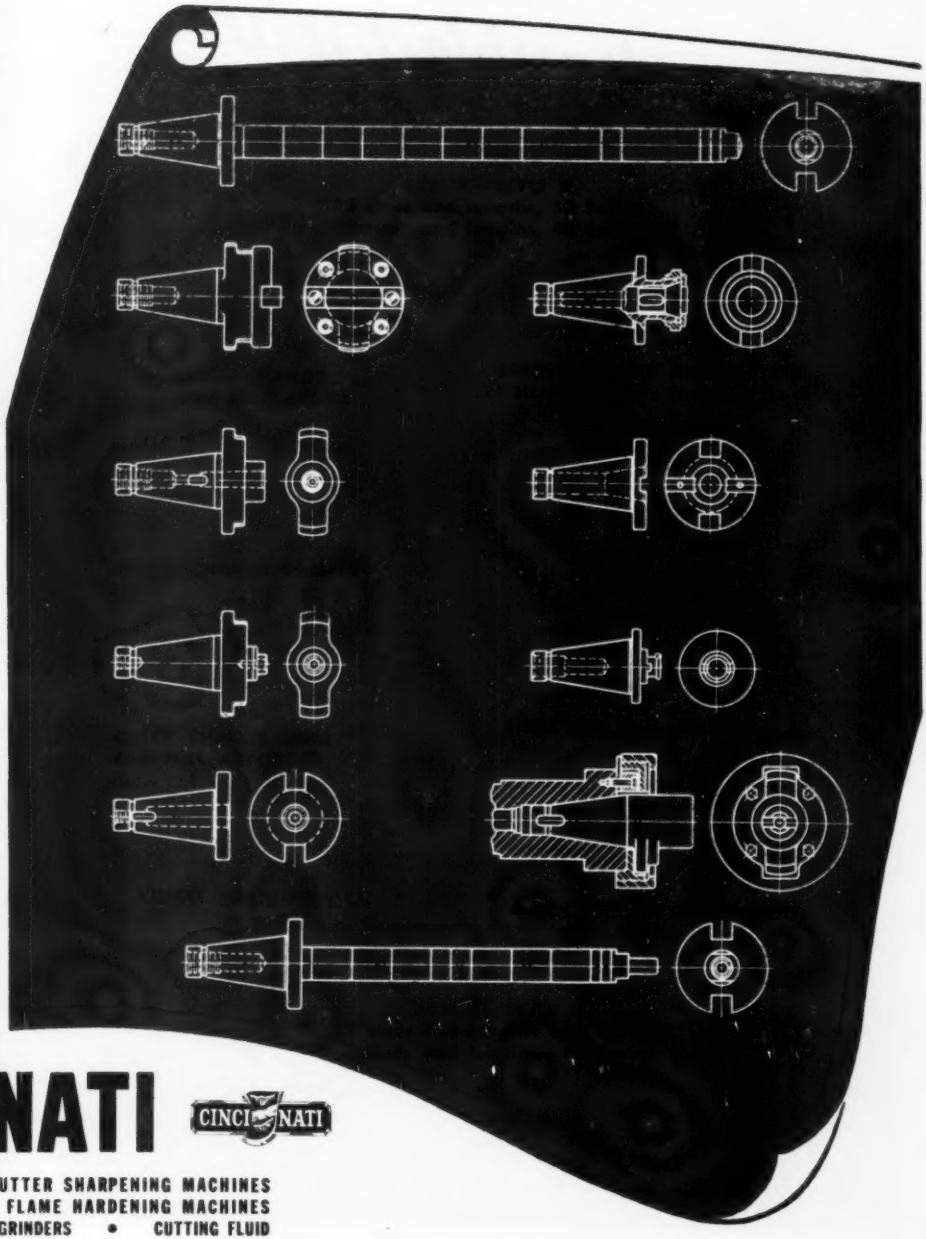


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Toolmaker's Vise

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MILLING MACHINES •
BROACHING MACHINES •
OPTICAL PROJECTION PROFILE



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CUTTER SHARPENING MACHINES
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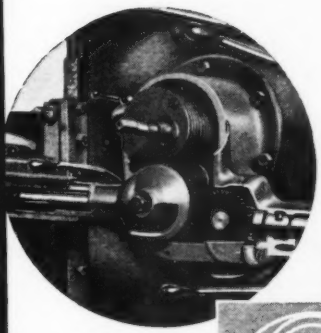
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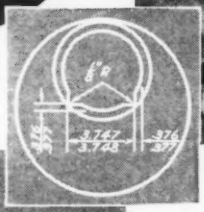
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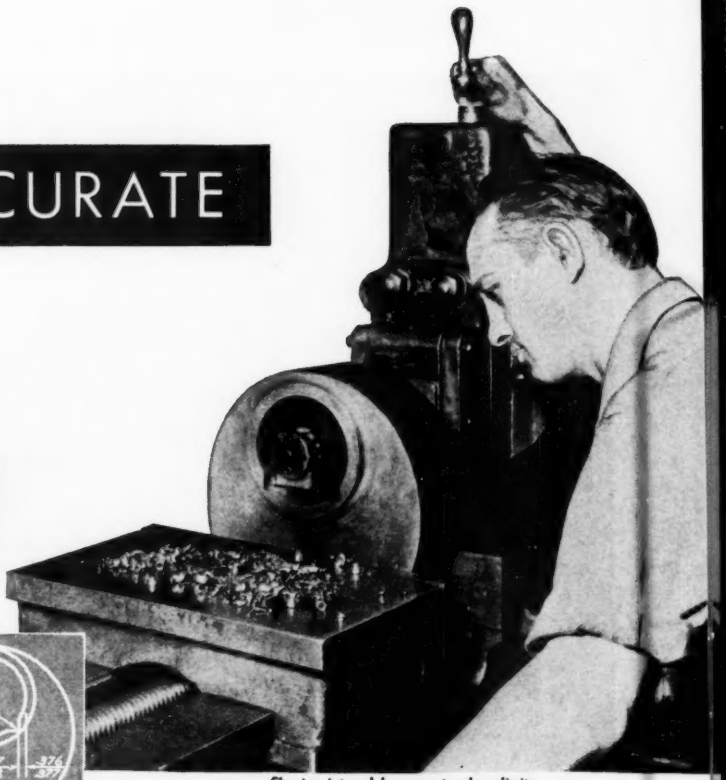
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ACCURATE

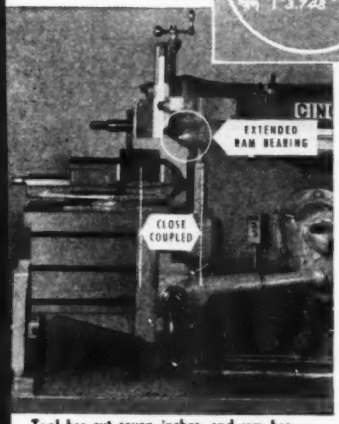


Exclusive Cincinnati Feed Mechanism





Shaping internal keyways to close limits.



Tool has cut seven inches, and ram has not moved beyond bearing support.

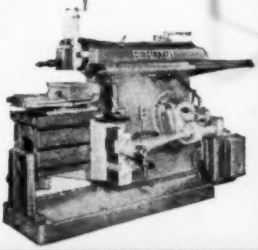
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No bumps, no gaps in the feed on a Cincinnati Shaper. The unique feed mechanism, with a cam for each feed always in contact with the follower, maintains both accuracy and a superior finish to the work.

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To further increase accuracy, a Cincinnati Shaper literally hugs the work. Extended ram bearings and full table clearance keep the work close to the column, reduce vibration and deflection, and consequent inaccuracies. A Cincinnati Shaper is the closest coupled shaper in the field.

For dependable, day in, day out accuracy, investigate a Cincinnati.



Write for complete Shaper Catalog N-5.

THE CINCINNATI SHAPER CO.

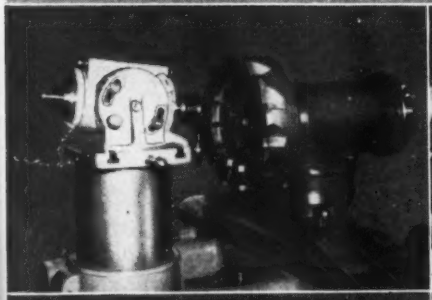
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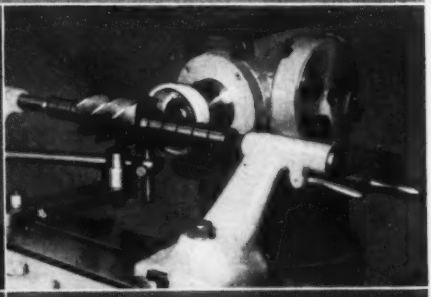
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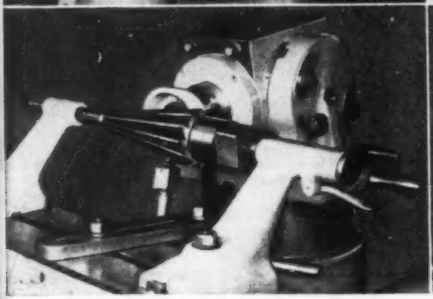
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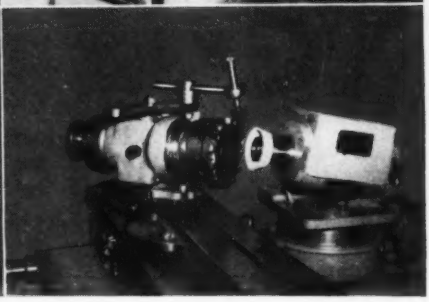
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Here's one you've always wanted — a totally enclosed, sealed lubrication, super precision 1 HP, 3600 RPM motorized tool and cutter grinding head, mounted on a new bracket that provides *angular adjustment in a vertical plane.*

POPE Spindles have the radial and axial rigidity to make wheels cut faster — spark out quicker. Grinding time is reduced. Softer wheels can be used for cooler grinding and for producing the kind of cutting edge that stands up.

Make the most of your present grinders. Equip them with this new and better POPE Spindle.

Ask us to quote price and delivery.

SPECIFY THIS POPE SPINDLE ON YOUR NEXT TOOL AND CUTTER GRINDER

No. 71

POPE

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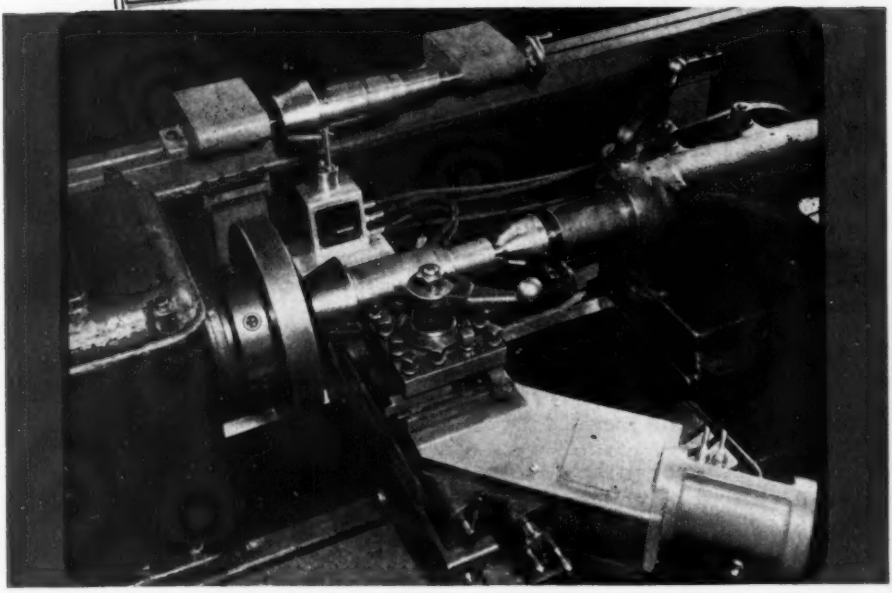
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ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES

TURCHAN QUALITY CONTROL!



First 1, then 10 more lathes in same shop converted to hydraulic tracer control

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The hydraulically controlled cutting tools take uninterrupted automatic cuts over the job. Work such as motor shafts, spindles, valve stems, back shafts, piston rods, axles — in fact, any shaft regardless of length, number of steps, tapers and radii are ideally produced on Turchan equipped lathes. There are also Turchan Follower attachments for converting milling machines, planers, shapers and grinders. "Turn to Turchan to cut costs!"

* *Name on request*

Get the facts. Send us a print or sample with specifications of any job you're planning, for a Turchan estimate.

Turchan FOLLOWER MACHINE CO.

8259 LIVERNOIS AVE. DETROIT 4, MICH.

Independent laboratory test for a leading machine tool builder reveals

WHY "BLU-MOL"® OUTPERFORMS ALL OTHER BLADES TESTED



Some time ago, a leading machine tool builder tried out a number of different hack saw blades under normal production conditions. "Blu-Mol" blades proved so outstandingly superior that the company decided to find out why and sent them to an independent testing laboratory. Here is the report they received:

Sample No. 407564 1-3-50

The "excellent" service given by this blade is apparently the result of three factors:

First, homogeniety of steel. The stock shows no evidence of high concentration of carbides in stringer formation which creates weak spots and brittleness.

Second, the relatively high hardness (C64.5) combined with fine grain size gives the necessary combination of tooth strength and toughness needed for a long service life. Usually hardness above C64 is attained at the sacrifice of grain fineness.

Third, surface condition. There is no evidence of lowered surface carbon content so commonly found in hack saw blades. This manifests itself by greater resistance to tempering and a consequent retention of a larger percentage of white martensite.

"Blu-Mol" steel is part of the secret of "Blu-Mol's" tremendous cutting ability. But even more important is the exclusive, precision heat treating process used only on Millers Falls blades. Try "Blu-Mol" and see for yourself how this outstanding blade can cut your hack sawing costs. Write today for a demonstration on your own work, in your own machines.

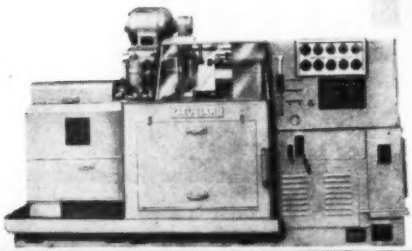


MILLERS FALLS COMPANY
GREENFIELD, MASS.

HERE'S HOW PRODUCTION WENT UP...WHEN A NEW CLEVELAND DIALMATIC WENT IN!

Eclipse-Pioneer Division, Bendix Aviation Corporation, blanks these parts on a new 2½" Dialmatic Cleveland.

they report these increases in production



Model AB Dialmatic Cleveland 2½" Single Spindle Automatic (Also supplied in 3" capacity)



And these are typical—not unusual—production increases. *Many* manufacturers have stepped up productivity by replacing prewar automatics and turret lathes with new Dialmatic Clevelands. How much will *your* production benefit? Let a Cleveland Engineer show you. Send us samples or part prints. There is no obligation, of course.

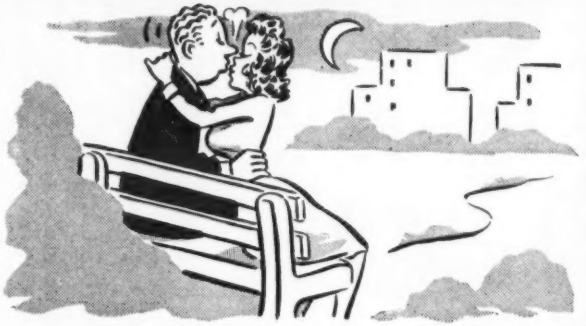
Remember... *Clevelands Cut Costs*

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4934 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • NEWARK

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines



There was a young man who went on a blind date —
And in just a few days, he made her his mate!

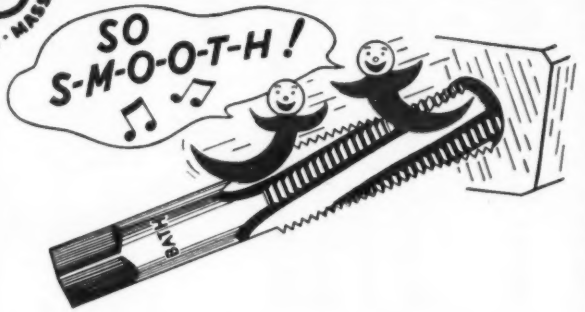


He jumped to conclusions and found out too late —
Her beauty was false . . . her curves were all straight!

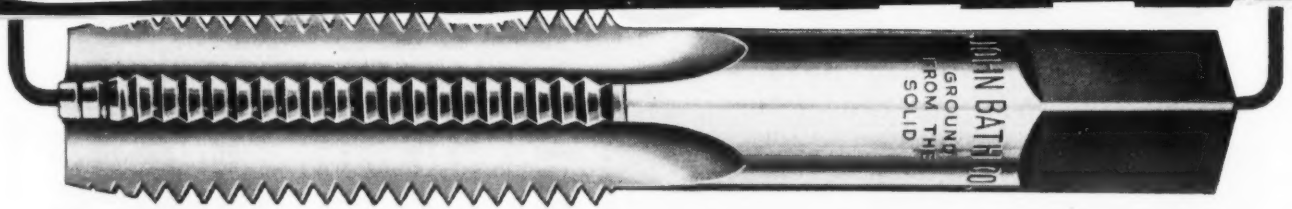
JOHN BATH CO. INC.
B
WORCESTER · MASS



When you order Bath Taps, won't you please stress
Complete and full details! Don't make us guess!



If you want chips to slide along curves that are smooth —
Insist on Bath Taps . . . they're RIGHT "in the groove"!



INSIST ON BATH TAPS . . . PROFIT BY THEIR PLUS-PERFORMANCE

The more we know about your use for Bath Taps, the better we can serve you! Such information will allow us to automatically provide the correct design of tap and apply the proper heat treatment for the metal you wish to tap. The smooth, polished flutes on Bath "ground from the solid" taps, will allow chips to slide, instead of piling up to clog and cause tap breakage.

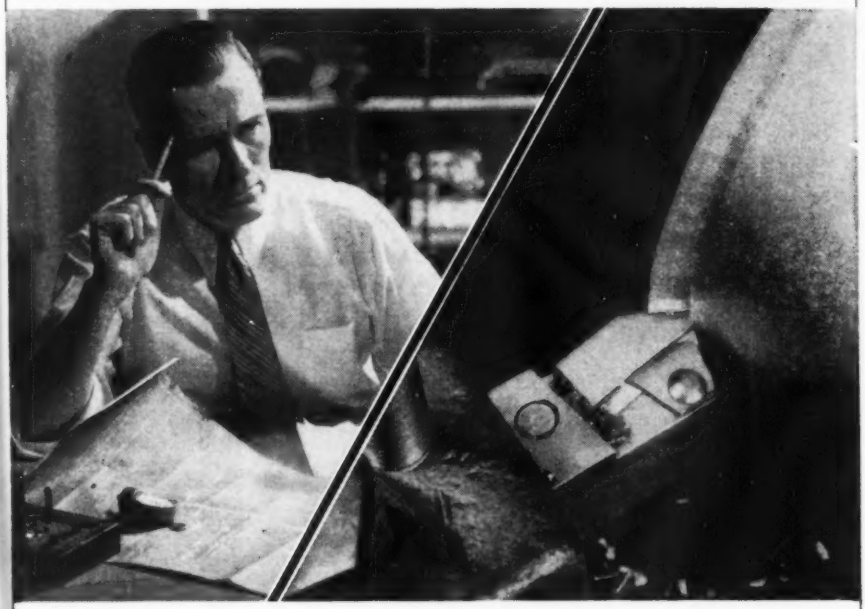
Full information about the material to be tapped, the machine, fixtures and lubrication will help . . . and in many cases will permit us to make suggestions that will increase your shop productions. See your Bath representative or write direct about your tap problems.

PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED

14 Grafton St., Worcester, Mass.

When the Going Gets TOUGH



Keep Going with Kennametal

• Are tough jobs slowing you down — hogging cuts from rough forgings . . . cleaning up sandy castings . . . multiple finishing of complex parts . . . precision machining that defies your efforts to hold close tolerances? Are you losing time on tight production schedules, having to replace worn tools frequently?

Use Kennametal — and keep going. Records show that Kennametal has machined up to four times as many pieces per unit of carbide consumed — on similar work under similar conditions.

That means Kennametal costs the user only about one-fourth as much in terms of service delivered. Furthermore — machines keep going — man-hours are more productive.

If the going is tough for you — let one of our engineers demonstrate how Kennametal smoothes out production problems.

KENNAMETAL *Inc.*, Latrobe, Pa.

MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTIVITY



CLAMPED-ON STYLE BLH | STYLE VG | "UNIVERSAL" FACE KENNAMILL | KENDEX STYLE 12SKD | KENNAMATIC STYLE RAL | SERRATED MILLING CUTTER BLADES



Rivett 918 "Steelway" Turret Lathe

Now you can produce small duplicate parts speedily in unlimited quantities with precision known only to the toolroom!

For here's a lathe that's been developed out of the bench class into a production machine. It has all the inherent precision for which Rivett has long been famous, plus time-saving features that reduce set-up and cutting operations to a fraction of that normally required. Single part production can be powered and cycled automatically.

Any one of 120 to 3750 RPM cutting speeds may be instantly and accurately selected; newly designed collets increase speed of operation as well as accuracy and gripping power; automatic chuck closer and well grouped controls step up operator time.

Bulletin 918ST will give you all the details. Write for your copy today.

RIVETT LATHE & GRINDER, Inc.

Dept. MBB3 Brighton 35, Boston, Massachusetts

For More Precision Work RELY ON RIVETT LATHES AND GRINDERS, The Master Craftsman's Master Tools

PLACE YOUR ORDER *NOW*
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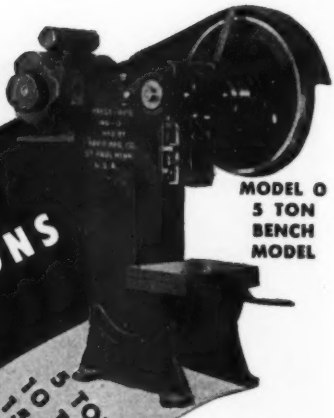
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OPEN BACK — INCLINABLE

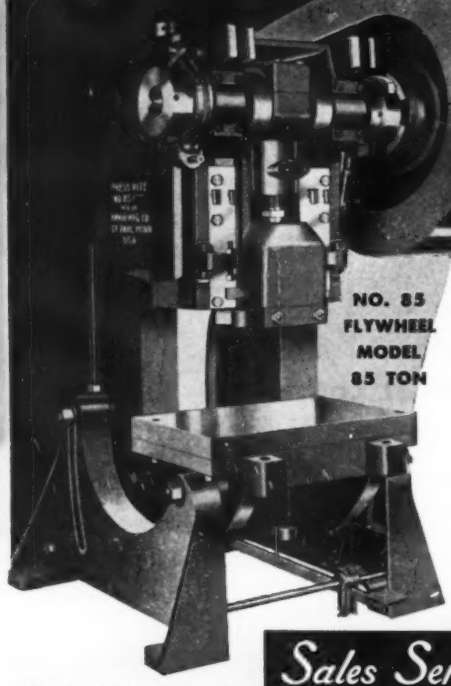
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A COMPLETE PRESS LINE 5 TO 85 TONS

5 TON
10 TON
15 TON
20 TON
30 TON
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MODEL O
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BENCH
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NO. 85
FLYWHEEL
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FOR
BLANKING
PUNCHING
DRAWING
FORMING
STAMPING

PRESS-RITE POWER PRESSES are now available in all models with reasonably prompt deliveries. Future material shortages may affect delivery schedules. Order now and have PRESS-RITE PRESSES in your plant for top production and lower operating costs. Take advantage of such PRESS-RITE features as Non-Repeat Single Stroke Safety Mechanism, Automatic Cam Actuated Brake, Greater Shut Height, and Triple Ramway Lubrication.

WRITE TODAY for free bulletin! You'll find that no press can match the PRESS-RITE'S many features.

ALSO AVAILABLE IN BACK GEARED MODELS

Sales Service Machine Tool Co.

PRESS RITE PRESSES | SHAPE RITE SHAPERS | KELLER POWER HACK SAWS

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Faster production at lower cost

MODERN COLLAPSIBLE TAPS

New



FOR EITHER STATIONARY OR ROTARY USE

- Easy and quick adjustment. No special tools required.
- Interchangeable shank for convenience in changing from one machine to another.
- Thread length setting undisturbed by diametrical adjustment.
- Extra rigidity with unusually sensitive collapse.
- Simple in design. No complicated mechanisms.
- Heavy chasers for greater strength. Chaser threads precision ground.
- All parts hardened and ground and precision fitted.

Modern Precision Tools Include . . . . .

STATIONARY SELF-OPENING DIE HEADS
ROTARY SELF-OPENING DIE HEADS
STATIONARY COLLAPSIBLE TAPS
ROTARY COLLAPSIBLE TAPS
MODERN-MAGIC CHUCKS AND COLLETS
SELF-OPENING STUD SETTERS
INSERTED BLADE FACE MILLING CUTTERS
SOLID ADJUSTABLE DIE HEADS
ADJUSTABLE HOLLOW MILLING TOOLS
UNIVERSAL CHASER GRINDING FIXTURES

Send for full information on this new improved Modern Collapsible Top and its cost reducing possibilities applicable to your tapping

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DIVISION OF
CONSOLIDATED MACHINE TOOL CORPORATION
ROCHESTER 10, NEW YORK

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Cooler-Cleaner **MACHINE TOOLS AND WORK**

FULFLO COOLANT PUMPS

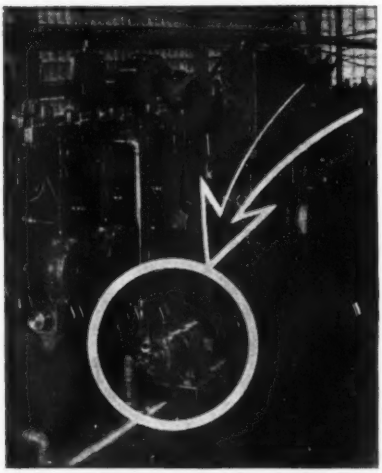
HARD-TO-GET tools must be nursed like babies with production demands at all-time highs.

Keep 'em cool and turn out more and better work with proper coolants brought to the right spot by FULFLO COOLANT PUMPS.

Pipe sizes ⅜" to 1½". Motor, direct or belt drives.

WRITE NOW on your letterhead for your copy of FULFLO MECHANICAL DATA BOOK.

An installation by The American Electric Fusion Corporation.

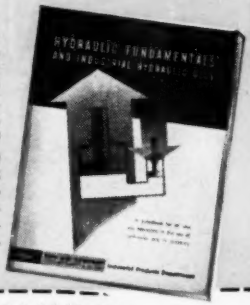


THE FULFLO Specialties Co., Inc.
BLANCHESTER, OHIO

NEW SUN PRODUCT CLEANS HYDRAULIC SYSTEMS Without Downtime!

SUN'S NEW HYDRAULIC SYSTEM CLEANER eliminates the production loss and man-hour loss that usually go with the cleaning of equipment. This product does its work *without interrupting production.* It has the detergency to remove the sludges and gums formed by oxidation of hydraulic oil, soaps formed from coolants and cutting oils, and other contaminants. Besides permitting operations to go on undisturbed, it protects the system against further rusting once parts have been cleaned. Sun Hydraulic System Cleaner has been thoroughly "Job Proved" in cleaning up hydraulic systems of presses, machine tools, and circulating systems of a great variety of industrial equipment. It is available in viscosities suitable for any pump. Get peak performance out of *your* equipment by using Sun Hydraulic System Cleaner.

FREE! to anyone who uses or maintains hydraulic equipment: this booklet by Sun Engineers on the fundamentals of hydraulic systems and the application of hydraulic oils. It will prove valuable as a guidebook in day-to-day work, a refresher course for engineers, or a readable instruction book for nonprofessionals.



Sun Oil Company, Philadelphia 3, Pa.
Dept. MT-3

☐ I should like a copy of "Hydraulic Fundamentals and Industrial Hydraulic Oils."

☐ I want more information about Sun Hydraulic System Cleaner.

Name _____

Title _____

Company _____

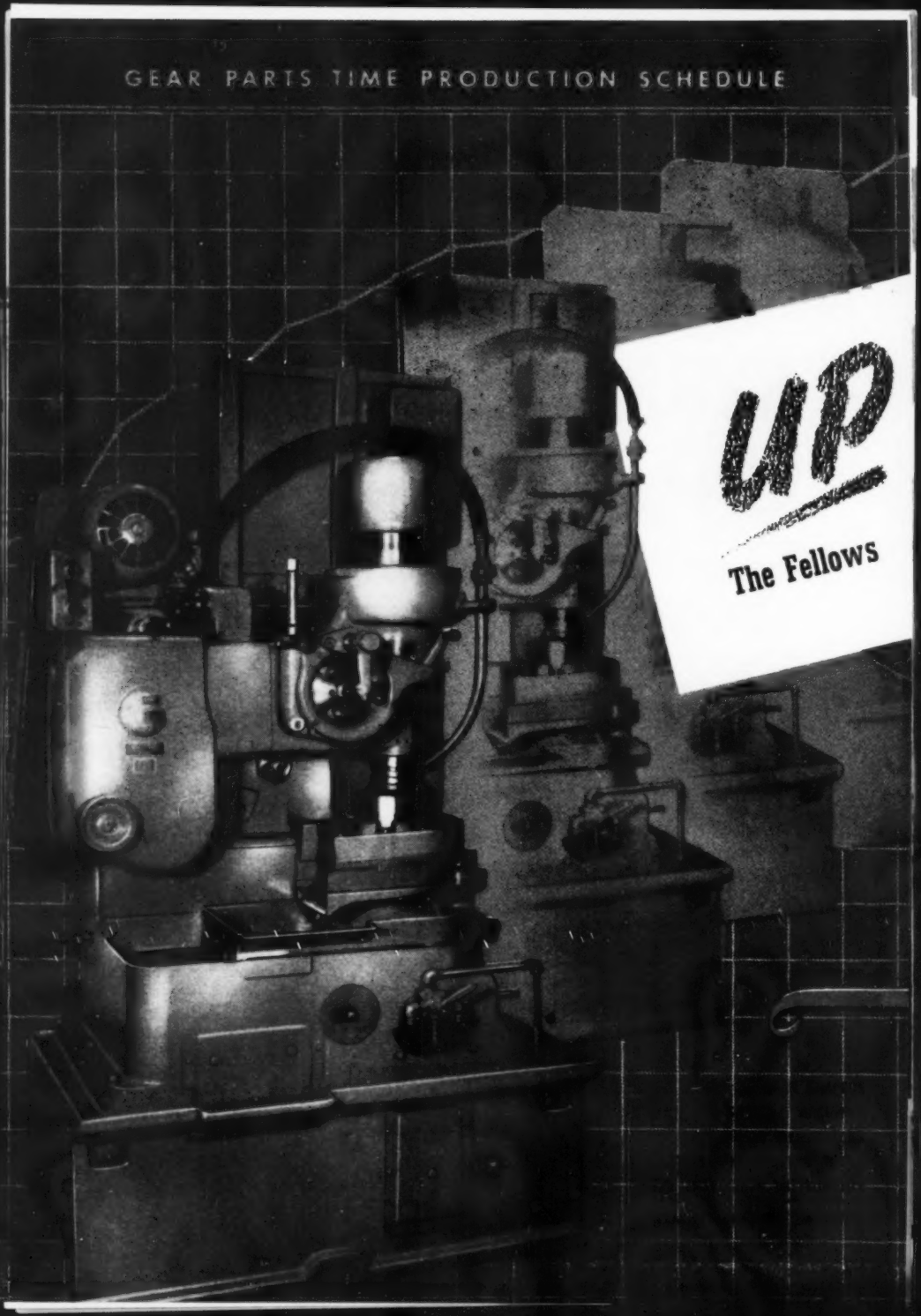
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SUN INDUSTRIAL PRODUCTS

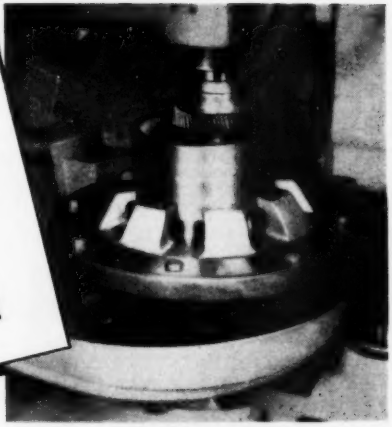
SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO & MONTREAL

SUNOCO


GEAR PARTS TIME PRODUCTION SCHEDULE
UP
The Fellows

GO TIME SAVING POSSIBILITIES

7A-Type Gear Shaper sets a Production Pace for 1951



For an internal gear part an air-operated diaphragm-type chuck like this makes loading and unloading a simple operation—for stop-watch timing.

- **AUTOMATIC QUICK-STOPPING OF CUTTER-SPINDLE RECIPROCATION**
- **AUTOMATIC POSITIONING OF CUTTER AT TOP OF STROKE (without coasting)**
- **AIR-OPERATED QUICK CLAMPING CHUCK**

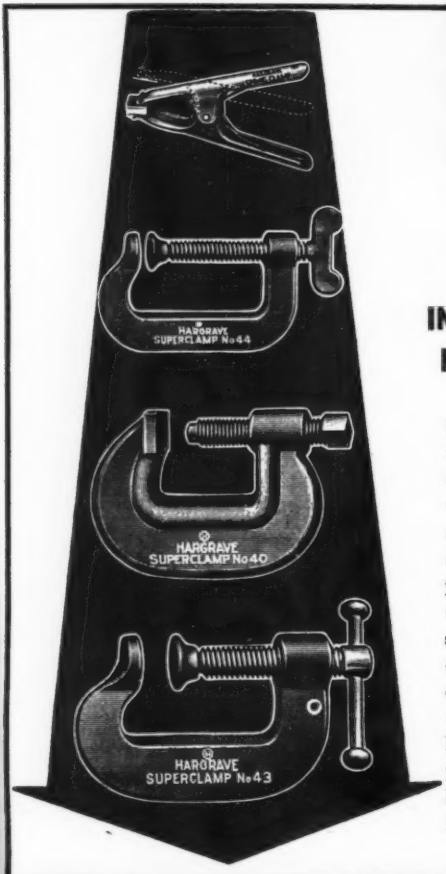
Due to its amazing versatility, the 7A-Type Gear Shaper is able to compete with other production machines on a floor-to-floor time saving basis. High cutting speeds and precision control have always been there. To these advantages have been added speed-up of work handling, quick-acting work holding devices, etc.

The machines illustrated are set up to cut cast iron internal helical gears 27/32″ face width, 16 pitch, 20° pressure angle, 79 teeth (5.1313″ p.d.)—and to finish each gear in 2 cuts in 5 minutes floor-to-floor time.

If your requirements are not sufficiently large to require the enormous production possibilities of the 10-spindle Rotary Gear Shaper, let us work out time estimates based on 7A-Type Machines with the latest auxiliary modifications. Write, wire or phone the nearest Fellows engineering-sales office.

Fellows

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont
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INDIVIDUALLY POWER-TESTED FOR BETTER PERFORMANCE

Hargrave Clamps are backed by 71 years of clamp know-how . . . unsurpassed in design, materials, and workmanship. Their tough, flaw-free construction means extra strength for extra service. All parts are subjected to rigidly controlled production tests . . . and accurately fitted by skilled craftsmen. Simple to adjust and release, they cut costs in hundreds of operations. Shown at left are a few of the complete line of Hargrave Clamps used and approved by industry everywhere. Made in openings from ¾ in to 12 ft., from ½ in. to 16 in. deep.

THERE IS AN INDUSTRIAL DISTRIBUTOR STOCK NEAR YOU

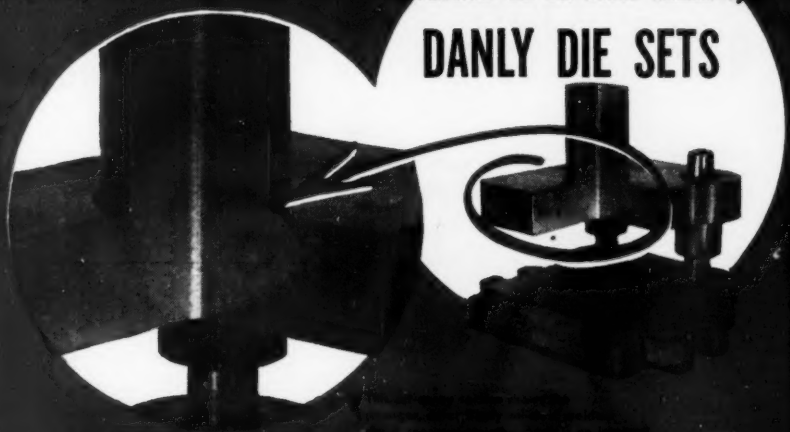
HARGRAVE Tested Tools
THE CINCINNATI TOOL COMPANY

Write today for free catalog showing the complete line of Hargrave Individually Tested Clamps, Chisels, Punches, Brace Wrenches, Star Drills, Dust Ejector Masonry Drills, Washer Cutters and File Cleaners.

THE CINCINNATI TOOL COMPANY
1945 WAVERLY AVE. CINCINNATI 12, OHIO

...ruction on all-steel shank ...

DANLY DIE SETS



A new welding technique that assures 100% fusion of shank to punch holder makes this superior construction possible. Knock out holes in the shank itself or machining on the punch holder face are much less likely to effect shank strength.

Features like this make Danly the nation's leading die set producer. Check these other Danly Die Set advantages and you'll see why die makers and production men everywhere prefer Danly Die Sets

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DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois



WHICH DANLY BRANCH IS CLOSEST TO YOU?

DANLY®

THE NEW Van Keuren 0 to 3" LIGHT WAVE MICROMETER

will improve your product . . .



CATALOG AND HANDBOOK No. 34

This 208-page volume represents 2 years research sponsored by the Van Keuren Co.



It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies free upon request.

THE Van Keuren Light Wave Micrometer is an instrument of exceptional merit, proven over a period of 15 years. It has enabled hundreds of High School boys and girls to produce and inspect parts to "Hundred Thousandths" of an inch.

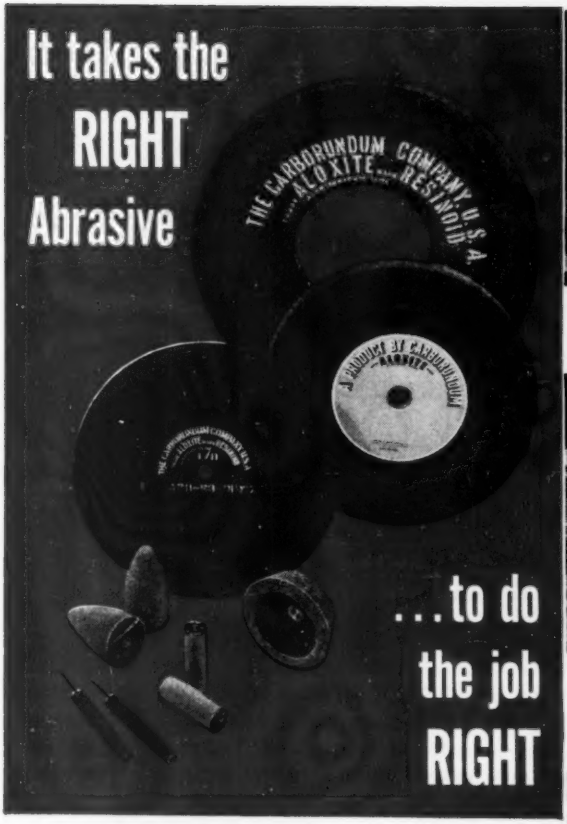
The New 0 to 3" Light Wave Micrometer has a ½" diameter, 40 threads per inch micrometer screw, which can be made with greater accuracy and which has 3 times the wearing surface of an ordinary micrometer screw. It has an 8" diameter micrometer wheel, with .0001" graduations 1/10" apart. It has a non parallax, vernier index which enables readings to be made to .00001". It has an index lock. It has carboloy tipped anvil and spindle. It is a sturdy, yet sensitive instrument which weighs 17 pounds. It is a portable measuring machine, built for "Sustained Accuracy."

The Light Wave Micrometer is not a comparator. No gage blocks are needed and no errors creep in from worn blocks. It is a direct source of dependable precision—fast, accurate and profitable.

THE Van Keuren CO., 177 Waltham Street, Watertown, Mass.

32nd YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Tenzi Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires



With production schedules stepped-up and costs on the rise, using the *right* abrasive becomes even more important in boosting output while effecting substantial savings. CARBORUNDUM'S complete line of bonded abrasives includes the right product for every job. It covers the full range of high and low speed wheels, disc wheels, mounted points, rubs and other special abrasives. To meet changing job requirements, continual improvements and developments are made in both products and their application. That's why, when you call in CARBORUNDUM, you are assured of the *right* abrasive for the job...the most efficient... the most economical...impartially recommended.



OUR NEW and improved V10 Bond Wheel is designed for low-speed equipment in grinding high tensile strength materials...a revolutionary modification.



TYPICAL OF NEW developments at CARBORUNDUM are improved B5 and B7N resinoid bond aluminum oxide and silicon carbide wheels for high-speed operations. They provide higher productivity with added safety.



ANOTHER RECENT development is the new VD Bond series of vitrified wheels...for grinding gray iron, hard malleables, semi-steel and non-ferrous metals.

Only CARBORUNDUM
TRADE MARK

"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, N. Y.

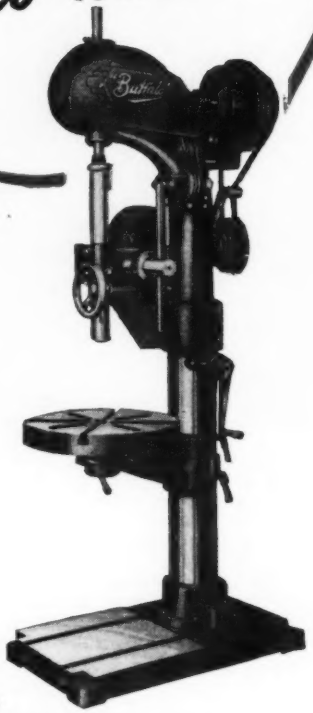
makes ALL Abrasive Products ...to give you the proper ONE



Good for all around shop work and it's easy to Handle!

"Buffalo"

No. 21 DRILL



Here's a powerful back-geared 8-speed drilling machine for general machine shop and production work. The No. 21 Drill has direct or back-geared drive and both lever and hand wheel feeds; countershaft is mounted on ball bearing pillow blocks for smooth and trouble-free operations. Crank adjustments for setups save time, as does the convenient location of all controls. Drilling capacity is 1½" in cast iron. 27" space from spindle nose to table allows room for most of your jobs. WRITE FOR BULLETIN 3746. Here's a drill with the features you want for all-around job work.

There's A Drill For Your Operation in the complete "Buffalo" line — from the high-precision No. 14 (⅜" capacity) Drill on up to the giant No. 22 (2" capacity) — one to six spindles, bench or pedestal models.

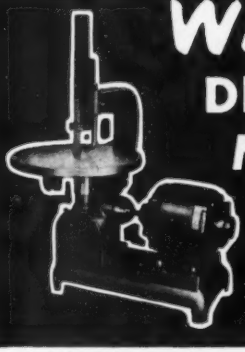
WRITE US ABOUT YOUR NEED!

BUFFALO FORGE COMPANY

161 MORTIMER AVE., BUFFALO, NEW YORK

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MEET the NEED for Production Speed-ups



With OLIVER DIE MAKING MACHINES

OLIVER OF ADRIAN



You'll have to meet many new and vital production problems this year. Prepare for them and bring your toolroom up-to-date with Oliver Die Making Machines. Speed up your production—reduce your costs—and produce more accurate dies with Oliver Die Makers.

Oliver Die Making Machine users report savings up to 60% because they are extremely fast and accurate on all sawing, filing and lapping operations. It will pay you to modernize your die making methods the cost-cutting Oliver Way.

Oliver Die Makers available in 5 models—

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" plus hydraulic feed.

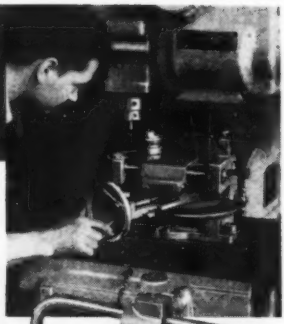
Write today for complete technical data on Oliver Die Makers.

OLIVER INSTRUMENT CO.

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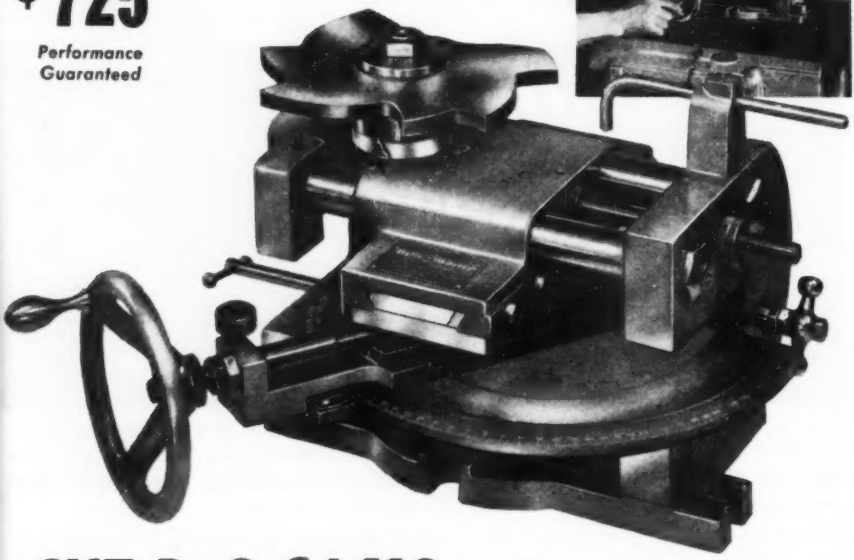
AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS—DRILL POINT THINNERS—TEMPLATE TOOL GRINDERS—FACE MILL GRINDERS—DIEMAKING MACHINES

Helix Master



$725

Performance Guaranteed

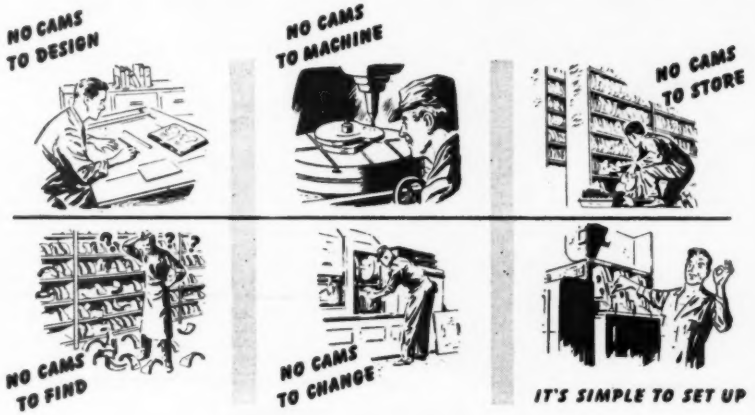


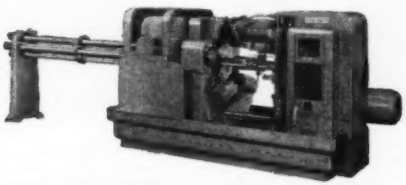
CUT B&S CAMS *In Your Own Shop*

Why hold up the job waiting for cams? Set up Helix-Master on your milling machine. Cut cams up to 9" dia. easily and accurately. Get greater tool life and higher speeds with perfect rises. No layouts required. No special skill or experience necessary. Now in use across the country

SHEFFER
COLLET COMPANY

No cam worries with a Warner & Swasey 5-Spindle Automatic





5-Spindle Bar Machines
—1¾" Standard Capacity
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5-Spindle Chucking Machine—6" Swing

WARNER & SWASEY
Machine Tools
Cleveland

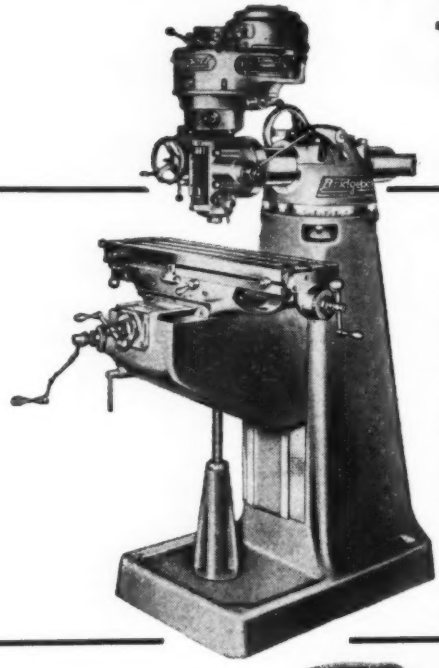
IT'S SIMPLER TO SET UP A WARNER & SWASEY CAMLESS AUTOMATIC!

A PREDICTION FOR 1951:

Bridgeport

TURRET MILLING MACHINES

will continue to win ever-widening acceptance



More than 12,000 are in service today

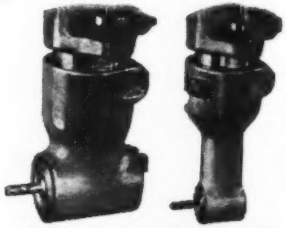
Since announcing the new Bridgeport 1 HP Head less than two years ago, these higher capacity machines with their recently developed attachments have been moving into metal working shops in a constant stream. Tool rooms, die shops and production lines are taking advantage of the greater versatility, capacity and convenience available to speed up the handling of larger, more difficult work.

Bridgeport Attachments are adaptable to machines already in service as well as to the higher capacity, 1 HP head, thereby making it possible to increase the productivity of "Bridgeports" wherever it is desired to do so.

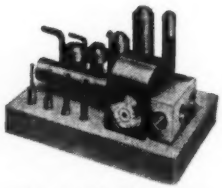
It will be to your advantage to ask for more detailed information.



MILLING MACHINE VISE
This improved vise provides greater gripping power. It is streamlined for attractive appearance and furnished with a large diameter screw for rigid holding. A coolant trough is provided. Made in two sizes; 3" x 3½" and 6" x 5" jaw openings.



RIGHT ANGLE ATTACHMENTS
Available in two types: Heavy duty (left) and light duty (right). The heavy duty attachment is made in two sizes and will mill and drill at right angles. It fits both the Master and the 1 HP Bridgeport heads. The light duty type is designed for milling and drilling of narrow, deep molds and cavities.



NO. 2 BORING HEAD
Boring tools and holder make this attachment capable of boring holes up to 6" diameter. It is available for use on the Bridgeport 1 HP Milling Drilling and Boring Attachment.

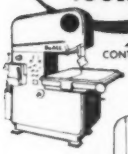
Bridgeport MACHINES, INC.

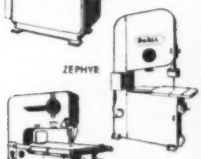
Bridgeport, Connecticut

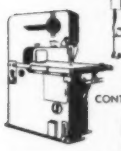
Manufacturers of High Speed Milling Attachments and Turret Milling Machines

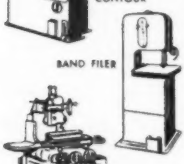
DoALL

INDUSTRY'S NEW SET OF TOOLS


CONTOUR-MATIC


ZEPHYR


CONTOUR


BAND FILER

TOOLROOM GRINDER


CRUSH GRINDER


"COOL GRINDING" ATTACHMENT


BLADE WELDER


GAGE BLOCKS


GAGE ACCESSORIES

VARIABLE SPEED DRIVES



SAW BANDS



Steel
Copper
Aluminum
Forgings
Dies
Plywood
Plastics
Laminates
Wood
Stainless Steel
Alloys
Heat-Treated Steel
Castings
Fiberboard
Rubber
Cloth
Books
Paper
Glass
China
Ceramics
Asbestos
Duralumin
Magnesium
Tungsten
Brass
Lead
Granite
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Plexiglass
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Tin
Zinc

NEW DoALL Contour-matic SIMPLIFIES MACHINING of ANY MATERIAL

- **Machines every known material**
- **Saws, files, polishes, grinds, hones**
- **Combines tool room accuracy with production speed**
- **Hydraulic power controls make it easy to operate**
- **Saves time of other more expensive machines**

The real time and money saving features of the DoALL can be demonstrated on your own work—in your own plant. Phone your DoALL Sales-Service Store or write . . .


Contour-matic — The first band machine tool with hydraulic operation


TOOL STEEL


BENCH FILER



The DoALL Company

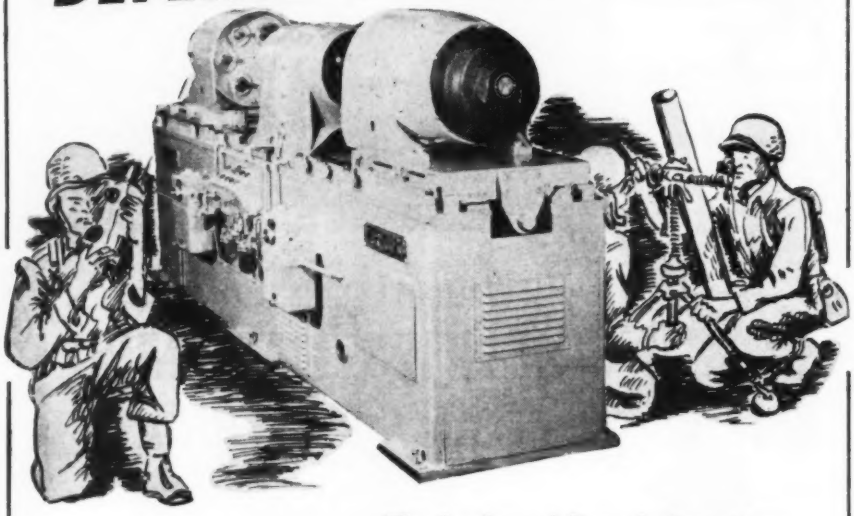
Des Plaines, Ill., U.S.A.

Cable Address: DoALL, Des Plaines

DoALL Stores in Key Cities

Factory Trained Representatives Everywhere

DEFENSE PRODUCTION!



The freedom of Peace loving nations has again been challanged . . . but, as before, American industry is ready and more than able to meet this threat.

We, of the Herzberg Corporation, are proud to offer this mighty industry the production with economy and efficiency that can be obtained with the Herzberg Multiple Drilling and Tapping Head. By being able to cut change-over time to the barest minimum you avoid delays which in these times are costly.

Why not let us show you how the Herzberg Head can speed your production economically and efficiently.

Write today for our free folders.

HERZBERG MACHINE TOOLS

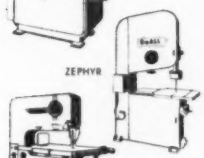
Herzberg CORPORATION

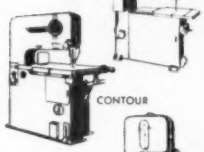
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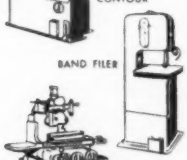
DoALL

INDUSTRY'S NEW SET OF TOOLS

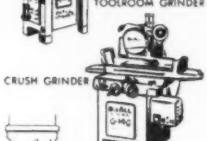

CONTOUR-MATIC


ZEPHYR

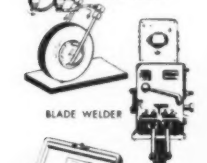

CONTOUR


BAND FILER

TOOLROOM GRINDER


CRUSH GRINDER

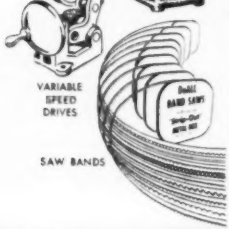

"COOL GRINDING" ATTACHMENT


BLADE WELDER


GAGE BLOCKS


GAGE ACCESSORIES

VARIABLE SPEED DRIVES



SAW BANDS



IMPOSSIBLE?

It's EASY with a DoALL SURFACE GRINDER!

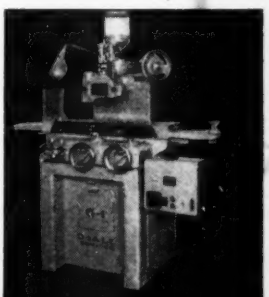
Problem: Grind a chuck-load of gage block blanks, flat and parallel to .0001" leaving .0001" for lapping. Surface finish must be .000007" RMS or better.

Solution: Use any DoALL Precision Surface Grinder, with "Cool Grinding."

Precision Grinding is one of the first steps in the production of DoALL Gage Blocks. DoALL Grinders have inherent rigidity, plus a fine spindle and smooth operation that make it possible to finish grind with cuts as deep as .025".

DoALL "Cool Grinding" adds to wheel life and prevents burning of the work.

Let us show you, through actual demonstration, how DoALL Surface Grinders can save you time and money. Write for complete information today.


"Cool Grinding" on the DoALL Super Precision Grinder (7 models available).


TOOL STEEL


BENCH FILER



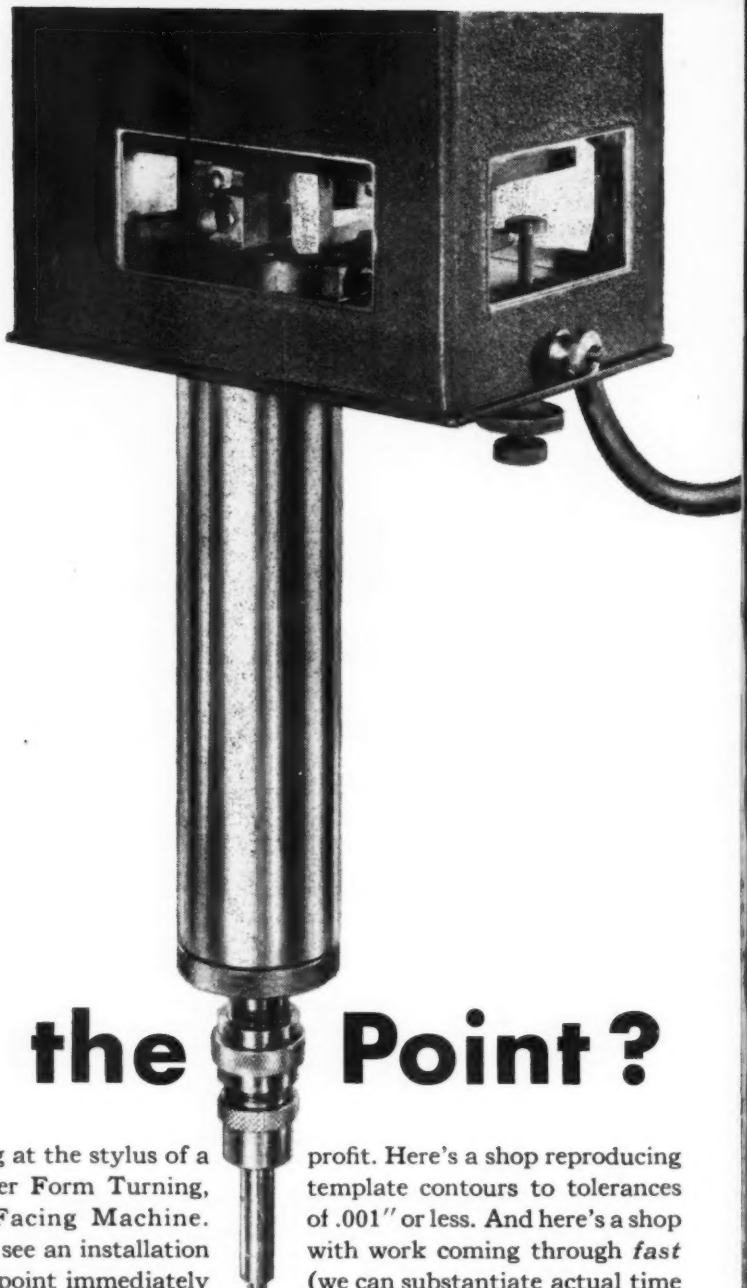
The **DoALL** Company

Des Plaines, Ill., U.S.A.

Cable Address: DoALL Des Plaines

DoALL Stores In Key Cities

Factory Trained Representatives Everywhere



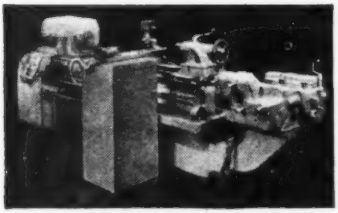
Get the Point?

You're looking at the stylus of a Monarch-Keller Form Turning, Boring and Facing Machine. Wherever you see an installation you'll get the point immediately—here's a shop using modern duplicating methods to reach peak production at maximum profit. Here's a shop reproducing template contours to tolerances of .001″ or less. And here's a shop with work coming through *fast* (we can substantiate actual time savings of 400-500%!). It's a good point, if it's in *your* shop. But it's tough, if it's competition.

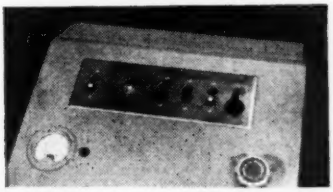
MANY ADVANTAGES are offered by this first of all tracer controlled turning methods—in which Monarch has now accumulated 21 years of experience.

Range and metal removing capacity are in no way limited by controls. It provides a unique universal stylus movement, thus effecting substantial time savings on many work pieces. It is recommended for the more intricate shaped molds and dies, for form rolls and for many intricately shaped parts.

Let us point out, too, that only Monarch can deliver your choice of three tracer controlled duplicating systems according to your needs. They are fully described in the three booklets mentioned in the coupon. Just indicate your interest, and we'll send you the ones you wish. *The Monarch Machine Tool Company, Sidney, Ohio.*



Monarch Series 60 Lathe with Monarch-Keller controls. These controls can be factory-applied to all Monarch Engine and Toolmakers Lathes, 14" size and up.



Push button control cabinet (above), electric tracer and magnetic clutches constitute system. It can be instantly disconnected for regular lathe work under manual control.

Monarch

ACCURACY • ECONOMY • LONG LIFE •

TURNING MACHINES

FOR A GOOD TURN FASTER...TURN TO MONARCH

THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio

Gentlemen: Please send without obligation the following complete Bulletins:

☐ Bulletin No. 2401—Monarch-Keller Controls ☐ Bulletin No. 2606—The Monarch Air-Gage Tracer

☐ Bulletin No. 2302—The Monarch Motor-Trace

NAME_____ TITLE_____

COMPANY_____

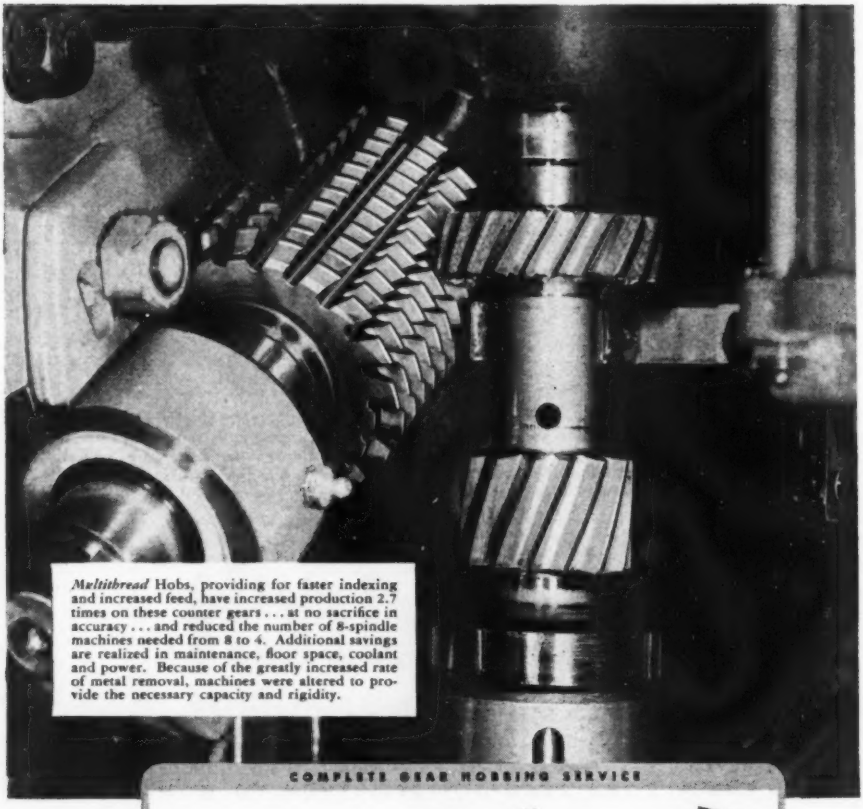
ADDRESS_____

CITY_____ ZONE____ STATE_____

Barber-Colman

Multithread Hobs

TRIM GEAR CUTTING COSTS

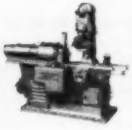


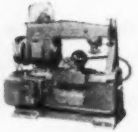
Multithread Hobs, providing for faster indexing and increased feed, have increased production 2.7 times on these counter gears . . . at no sacrifice in accuracy . . . and reduced the number of 8-spindle machines needed from 8 to 4. Additional savings are realized in maintenance, floor space, coolant and power. Because of the greatly increased rate of metal removal, machines were altered to provide the necessary capacity and rigidity.

COMPLETE GEAR HOBBING SERVICE

BARBER COLMAN

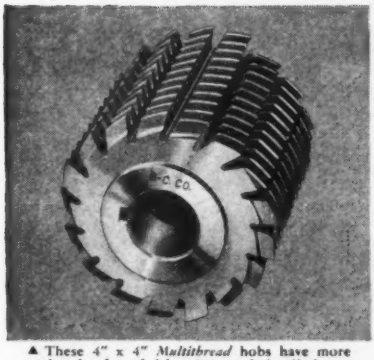




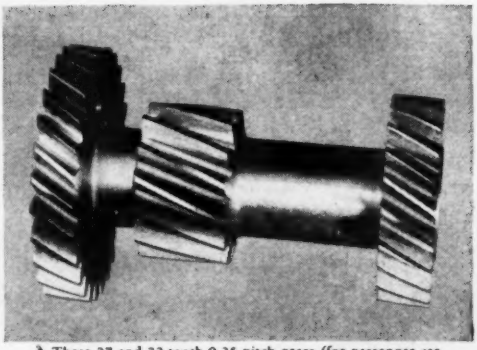




HOBS • MACHINES • SHARPENING • TECHNICAL DATA



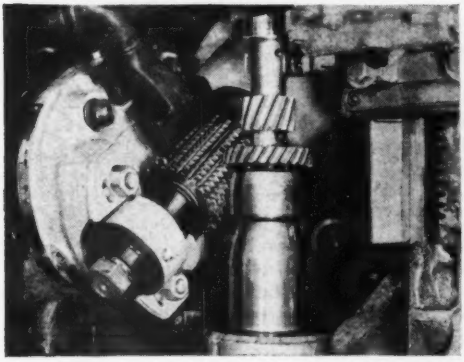
▲ These 4" x 4" *Multithread* hobs have more gashes for finer finish. A taper hole eliminates runout, holding the pitch line of the cut gears to maximum concentricity. Precision spacing of 3 leads produces involute and tooth spacing to preshave limits.



▲ These 27 and 22-tooth 9.25 pitch gears (for passenger car and truck transmissions) are forged from AISI 5145 or 8620-H steel. *Multithread* hobs have cut costs per gear to slightly over 1/3 former average. Lead errors are held within .0005". Production per hour has been increased from 26 to 82 gears (net, at 85% efficiency).

Automotive Plant Pioneers New Hob Application with Barber-Colman Hob Engineers. Disregards Conventional Hob Design to Almost Triple Production. Cuts Costs to ⅓ Previous Average.

▼ The 27-tooth gear on the counter gear is hobbed at 156 rpm and .062" feed. Previous feed was .053". Face width is 5/8". Cutting time per gear has been reduced from 6.55 to 2.2 minutes. Remarkable savings are possible because of increased feed and faster indexing with *Multithreads*.



The 22-tooth gear on the counter gear is hobbed at 156 rpm and .052" feed. Cutting time is 2.16 minutes. Single-thread ground hobs formerly cut at .043" feed. Hobbing time averaged 6.13 ◀ minutes per gear.

Multithread Hobs are a development by Barber-Colman engineers, providing faster indexing in the hobbing of gears. Instead of the usual single lead, *Multithreads* have several threads, and have produced unusual production increases on gear cutting jobs requiring very high rates of output.

As a result of production gains possible with hobs of this design, a fewer number of hobbing machines are required to complement the finish shaving and grinding equipment.

Multithreads are recommended only on the basis of comprehensive analysis of the job factors in individual plants. Therefore, we suggest that you ask a Barber-Colman Representative to call.

Write for additional information about the production increases possible with *Multithread* Hobs.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 302 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

BUILDERS OF PRECISION GEAR HOBS AND MACHINES SINCE 1911





the "holes in our heads" are full

. . . OF COST-CUTTING IDEAS

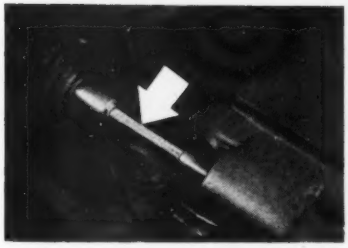
Yes, the "holes" in our engineers' heads are full of ideas to give you newer, faster, lower cost methods of boring . . . methods that save you time and money. If your job needs a special bar or special cutter, we'll design and make it. Chances are a standard Madison cutter in the right Madison bar will give you greater production economy. The Madison line, built over a period of thirty-five years, is broad enough to fit nearly any boring requirement. Let Madison's experienced boring specialists . . . the "men with holes in their heads" . . . help you cut your boring costs. Submit your problems for recommendations by our problem solving tool design department. Of course there's no obligation.



Write for the information filled Madison Catalog. It is yours for the asking.

MADISON MANUFACTURING COMPANY
DEPT. BB MUSKEGON, MICHIGAN

THESE POWER DRIVE PROBLEMS ARE "DUCK SOUP" FOR S.S.WHITE FLEXIBLE SHAFTS

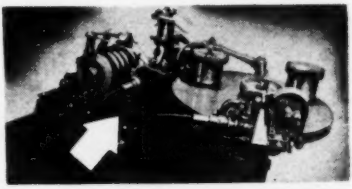


‹ MISALIGNMENT

When misalignment is a factor, as in this adjustable pulley drive on a large turret lathe, an S.S.White flexible shaft provides a positive, vibrationless drive which eliminates the necessity of accurately aligning the coupled spindles.

CURVES ›

When power has to turn corners, as in this sock darning machine, a single S.S.White flexible shaft is all that's needed, because it's especially designed to transmit power in paths other than straight lines.





‹ ADJUSTABILITY

As in this saw sharpening machine, the non-rigid construction of an S.S.White flexible shaft allows the driven member to be set in a wide range of different operating positions.

WRITE FOR NEW BULLETIN 5008

It contains the latest information and data on flexible shafts and their application. Write for a copy today.



THE S.S.White INDUSTRIAL DIVISION
DENTAL MFG. CO.

Dept. H, 10 East 40th St.
NEW YORK 16, N. Y.

WOODWORTH



DIAPHRAGM ARBOR

Precision
TURNING
HOBBING
SHAPING
GRINDING

For complete information
write for December issue
of NAWCO NEWS

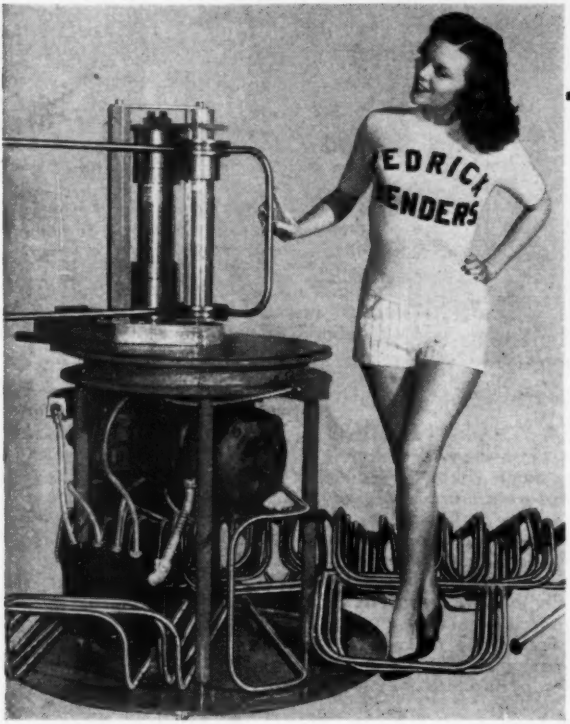
WOODWORTH

N. A. WOODWORTH CO., 1300 EAST NINE MILE ROAD • DETROIT 20, MICHIGAN

COMPLETE LINE OF PRECISION GAGES • DIAPHRAGM CHUCKS • CONE-LOK JIGS

FIGURES ARE WHAT COUNT

SAVE MONEY WITH PEDRICK BENDERS



Pedrick Production Benders are inexpensive to buy. Furthermore, they are inexpensive to run. An inexperienced girl operator can get the same quality and production on one as a journeyman machinist. This is so because the Pedrick Bender does everything except think. This means that a low labor cost is realized without sacrificing the quality of the job. The result is a low cost per piece, which is the aim of all shop management.

Write for Descriptive Folder

Bends Pipe	Bends Tube	Bends Strips	Bends Shapes	Bends Bars

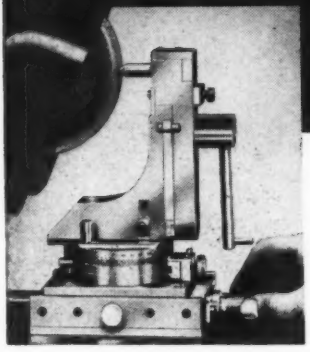
PEDRICK TOOL AND MACHINE CO.

3641 N. LAWRENCE ST., PHILADELPHIA 40, PA.

More Production per Man Hour

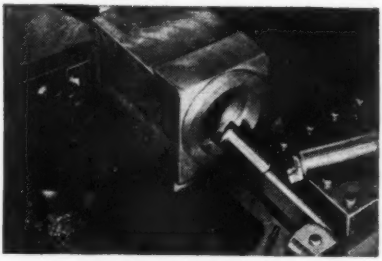
with Machine Shop TIME SAVERS

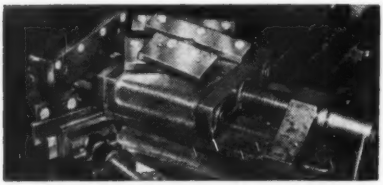
by J&S



J & S "Fluidmotion" RADII and ANGLE DRESSERS dress entire angle-radius-angle profile **in one continuous motion**—with one easy set-up! Automatic centering, dustproof and chatterless, high-carbon, high-chrome steel construction. Dresses wheels up to 20" diameter—easily adaptable to all surface and cylindrical grinders, with J & S fixtures.

J & S KOALA "Circular" CUTTING TOOLS. New or re-sharpened cutters inserted in same shank **without re-setting** machine or stops—each accurately **repeats** original set-up position! **Easy** to re-grind, low-priced, simple. Major uses: Internal—boring, facing, threading, forming; External—turning, facing, forming, threading. Photo shows typical deep boring, boring and internal facing operation, external facing and turning. 12" Boring Bar removed to show carbide head after numerous re-grinds.





J & S "Down-Hold" VISE JAWS and "Attachable" PARALLELS, used with regular vises, save 25% to 75% on loading time! VISE JAWS force work-piece down—"stops" provide accurate position. **Eliminate** hammering, feeler gauges, allow repetitive operation. PARALLELS snap into place, are **forced down** so chips can't get under them. **Eliminate** wiping vise and parallels after each operation. Both Vise Jaws and Parallels easily attached to **any type** and size machine vise.

Also: J & S "All-Purpose" JAW CLAMPS (see center photo) for quicker set-ups, better grip; J & S Form Grinding Service ---special tools to specifications.

Write for Further Information

J&S TOOL CO., INC.

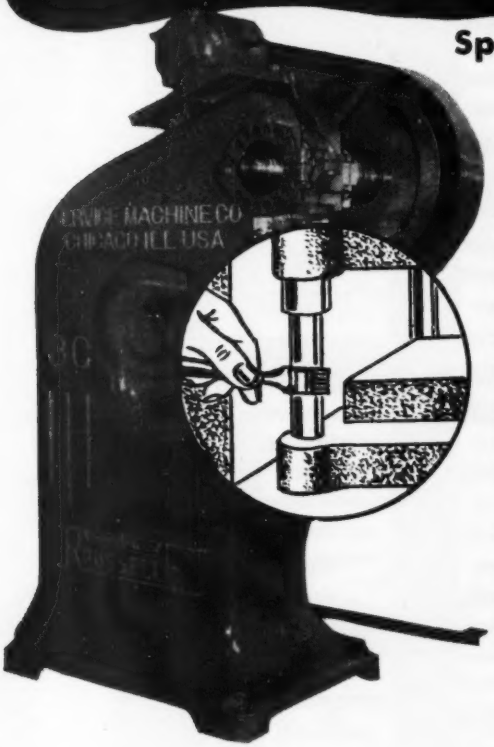
471 Main Street, East Orange, N. J.

Representatives in Principal Cities

Insist on

COMPLETE PROTECTION

for Pins and Bushings!



Specify **CMD**

Anti-Scoring

LUBRICANTS

These Concentrated lubricants have no equal for use on guide posts and bushings of die sets because they give *Complete* protection for a long period of time. Check their many outstanding advantages.

1. They outlast ordinary lubricants three to one.
2. They prevent any metal to metal contact.
3. They increase die life.
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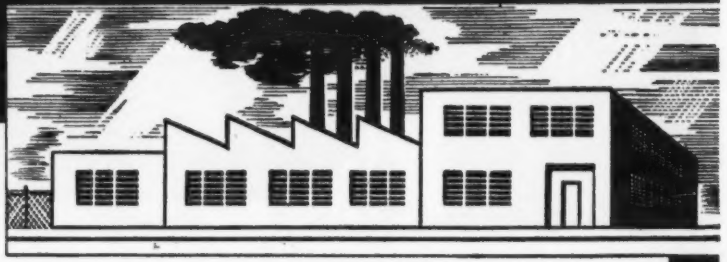


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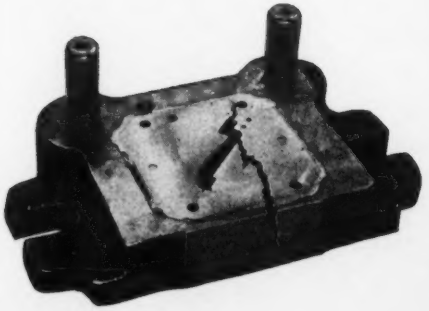
One of the great dangers to this country's defense program is the breakdown of our production continuity.

We must keep our industrial machinery running efficiently and with a minimum of manpower to avoid the fantastic time waste, dollar cost and manpower loss due to broken dies and tools. That is the vital role Protectron can play in your plant.

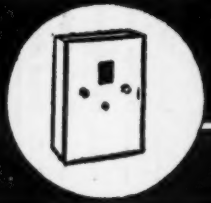
Protectron senses minute increases in mechanical load and automatically "trips" machines before damage occurs.

Protectron can be a potent force in reducing your overhead. Not only does it eliminate tool and die breakage but its vigilant protection increases one operator's efficiency 4 times by enabling one man to operate 4 machines, thus releasing 3 men for other work. It is adaptable to automatic presses and other machinery where damage to tools, dies and equipment would mean expensive replacements and loss of valuable production time.

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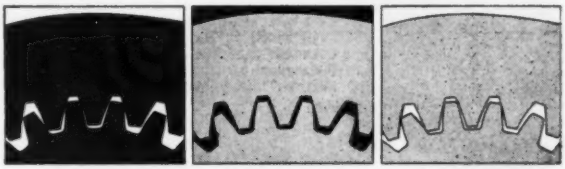
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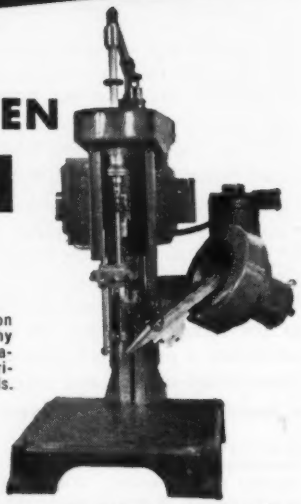
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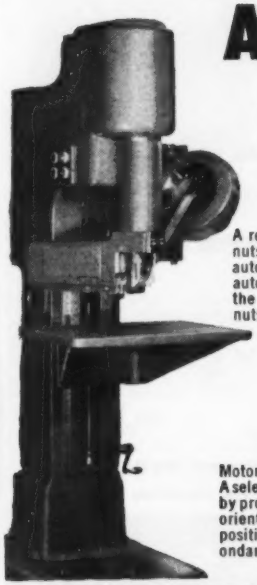
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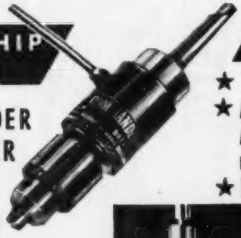


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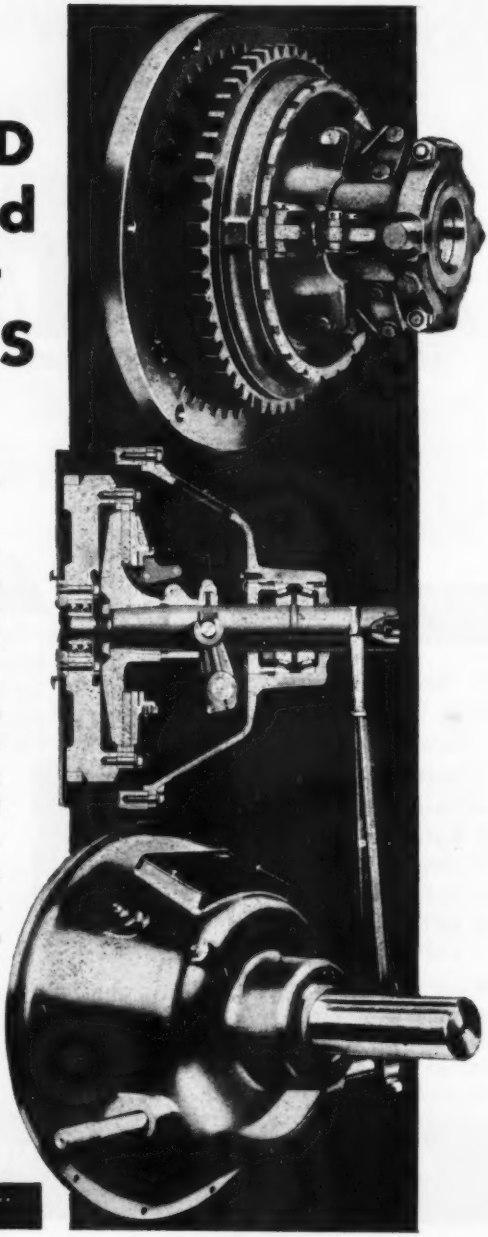
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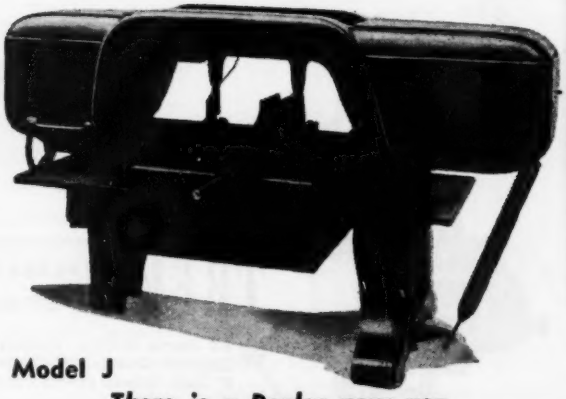
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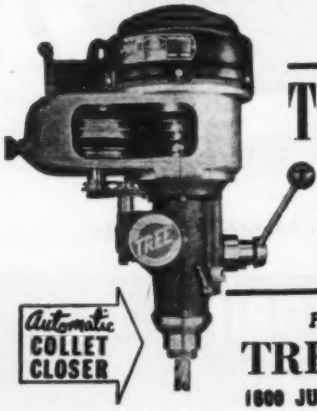
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* **Straight boring . . . as shown at left used as offset boring tool.**
* **Facing . . . up to 10" in diameter.**
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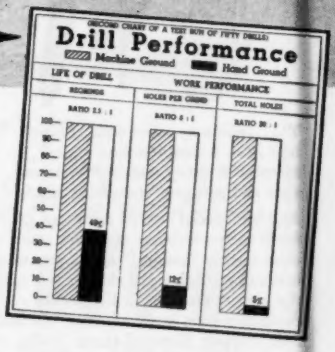
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. . . and still get "something special"

Yes...you may select your required taps from a complete line of Hanson-Whitney *standard* styles and sizes and still get "something special."

And by "special" we do not mean extra-cost, made to specification taps. We mean standard extra quality "finished" taps...ground after hardening to give you the keenest cutting edges, the highest accuracy in lead, angle and diameter. All customary sizes in Hand Taps, Machine Screw, Nut, Tapper, National Hook, Pulley, and Pipe Taps are stocked for fast shipment in protective, clear-labeled, cartoned boxes. For maximum tap life and maintained accuracy, specify H-W.

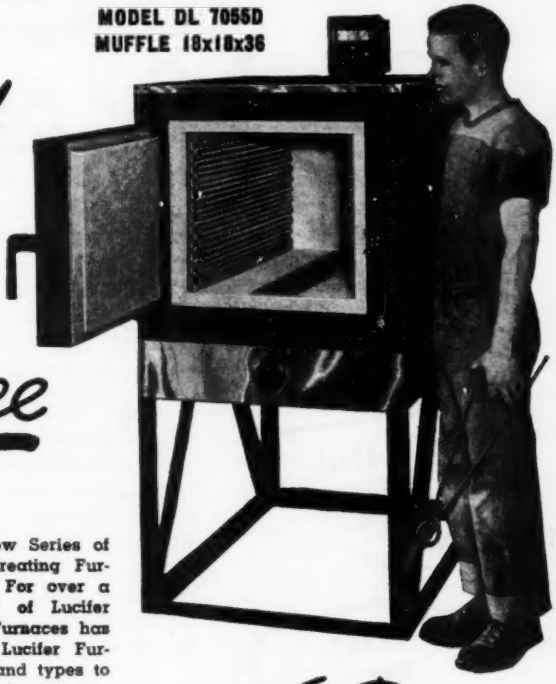
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MTBB

MARCH 1951

featured in this issue

New G & L Machine Handles Multiple Operations On Diverse Types of Work. Several important changes have been made in this planer-type horizontal boring, drilling and milling machine. Power-operated under-arm and tracer control expand the versatility of this machine. Single, general purpose, machine performs work of several other special tools. Page 73

Reduced Vibration With Resilient Mountings, by Francis A. Westbrook. Vibration is an important problem in industry. Not only from the damage it ultimately will cause on the machine but in its effect on the accuracy of the work being performed. The author describes some vibration problems and how they have been overcome by different manufacturers. Page 82

How One Manufacturer Uses New Dy-Check Inspection Method, by Fred M. Burt. Here is a description of the new inspection method which is arousing comment in the industry. Reported by Fred M. Burt is an explanation of how this method is being used by the Byron Jackson Co., Los Angeles, Cal. Page 94

Special Report on Chucking Machines, Turret Lathes, Hand Screw Machines, Part 2. This is the second part of this section which began with the February issue. It is the tenth of a continuing series of special reports describing the manufacturers, types and major specifications of American-built machine tools. Included in this special report is an article on carbide high velocity turning, descriptions of late model machines, major specifications of American-built machines. Page 105

National Automatic Tool Company Celebrates 50th Anniversary. Some of the advances made in drilling during the last 50 years are described. Page 140

Shop Hints. Page 158

Modern Tools in Action. Page 171

Job Instruction in Four Easy Steps, by Ed. Mottershead. Job instruction can be made difficult or it can be made easy for both foreman and learner. Several different means are used. The author discusses both and describes what his experience has taught him to be the best method for efficient training of a new worker. Page 185

Available Literature. Page 217

New Books. Page 226

New Films. Page 229

What's New in Metalworking. Page 235

Mechanics Through the Ages. Page 322

Products Index. Page 324

Index to Advertisers. Page 330

REPRINTS OF SPECIAL REPORTS AVAILABLE

There are still a number of reprints available (at no charge) of the following special reports on American machine tools: Milling Machines; Honing, Lapping, Superfinishing; Automatic Screw Machines; MAPI Replacement Formula Chucking Machines, Turret Lathes, Hand Screw Machines, Part 2. Write Machine and Tool Blue Book, Wheaton, Ill.

Higher *Production* Lower *Costs*



Fifty-three minutes are saved in the time for drilling on each of the brake tongs that are being manufactured at the Red Lion plant of The Budd Company. The brake tong is a part of the disc brake assembly, and involves 1-1/8", 1-1/16" and 1-7/16" diameter drilling in tough steel. These parts are produced in sufficient quantities to warrant the use of the simplified production type four-spindle gang drill. Each unit of this machine is powered by a 7½ HP driving motor, and one operator can keep all four units performing at peak capacity.

If your work includes mass production drilling, this is the type of machine you will want to know about. Its husky design and many features for convenient, fast and dependable operation, will interest you. Single units as well as gang drills are available in 21", 24" and 28" sizes, and with 3, 5, 7½ or 10 HP motors. These powerful DIRECT DRIVE Super Service machines are especially adapted to utilize drill heads.

Investigate the time saving possibilities by writing today for Booklet U-27.

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Radials 7½" dia. col., 2½' arm. to 26" dia. col., 12' arm.
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Jig Borers, Portable Horizontals
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THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

MTBB
MARCH 1951

as the editor sees it

The Time For A Union Is Now

Some manufacturers are drawing on the productive facilities of the smaller shops located in their areas. Many production jobs, aside from jigs, fixtures and die work, are being successfully and quickly accommodated by these small machine shops. Far-sighted planning is here discernable, the kind of planning which must be brought to illuminate the problem of building a military force without diluting the civilian economy.

During World War II many industries were slow (others didn't even bother to try) to nail down the facilities of the "alley shops," as some manufacturers called them. The war and post-war years proved these "alley shops" to be efficient and capable of producing components in healthy quantities. They built and mainted a respect which was more Park Avenue than Alley. It is therefore gratifying to observe manufacturers beginning to farm out their work without looking down at their noses while so doing.

There is a tremendous advantage for the manufacturer in sub-contracting portions of his prime contracts. He adds to his skilled labor force at a time when it takes more skill to find a labor force than the force, when found, is skilled. The small shop represents an addition to his production facilities and is more flexible than the fanufacturer. To make a change in a dimension is sometimes accomplished by picking up the phone, wheras in the larger shops this change is attended by directives, memos, letters, phone calls, and requires the work of engineers, typists, mimeographers and several small delivery boys who dash madly around the shop, a menace to life and limb.

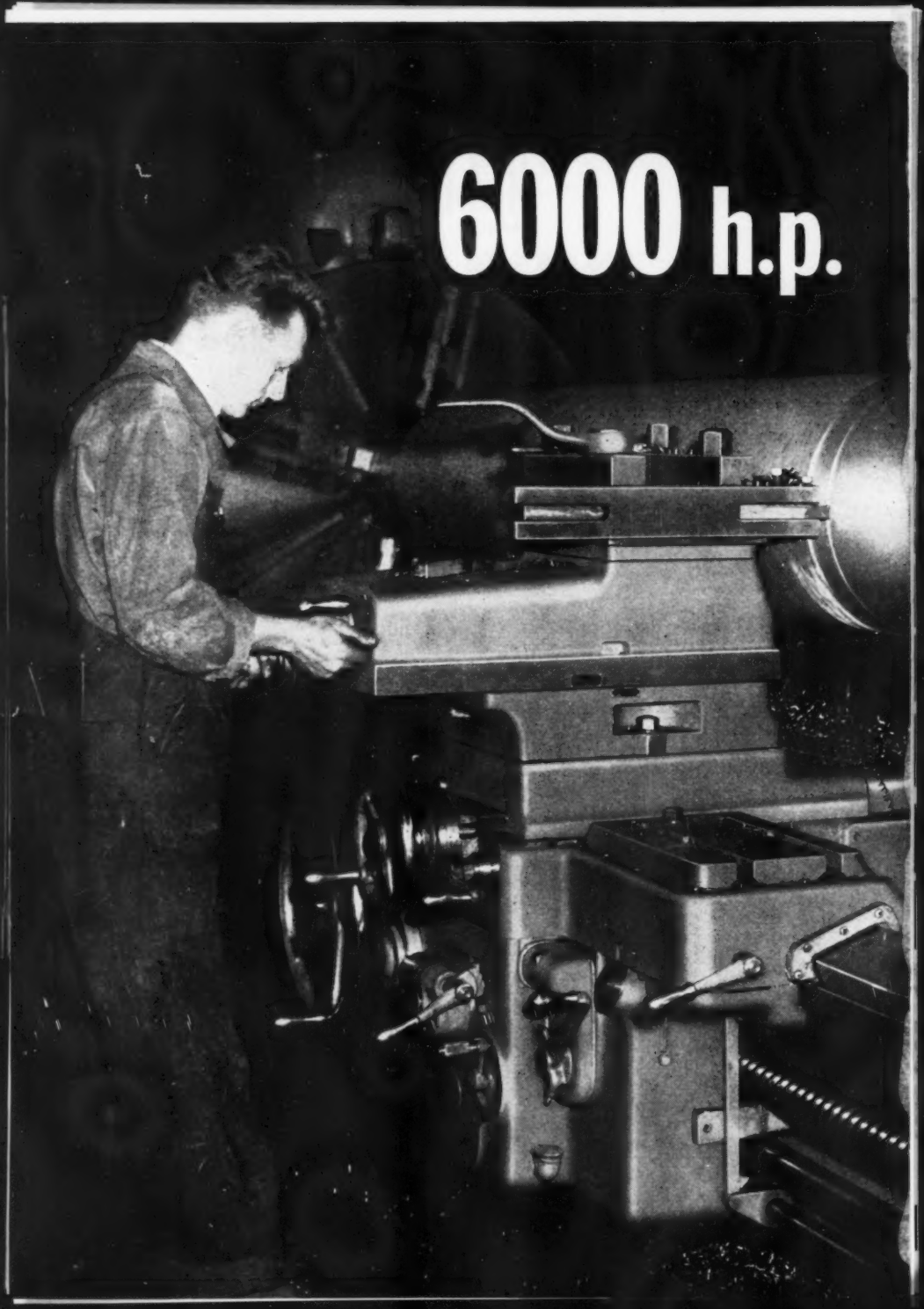
For the small shop this parceling out of work is profitable. He need not brave the jungle in Washington and hack his path through the red tape to unearth an individual who might or might not be able to place an order. A most expensive safari for a small business-man.

His labor problems are not as acute as the large manufacturer's; he is not reluctant to hire the handicapped and the oldsters because his personnel problems and policies are not as complex and rigid as those of the big shops. As for flexibility, he's got it!

The advantages to both manufacturer and small business resulting from a union are enormous.

The time for both of you fellows to get together is now.

William F. Schleicher


6000 h.p.

will go through this shaft!



This tailshaft turns the screw in a C-2 Cargo Vessel. It's made to take the relentless pounding of a 6000 h.p. power plant for weeks without letup.

To machine it accurately and economically, Moore Dry Dock Co. of Oakland, California needed a powerful precision lathe. That's why they gave the job to a new LeBlond 50" Heavy Duty Lathe . . . recommended by LeBlond Distributor, Bulotti Machinery Co. of San Francisco. Result? *17 hours off former machining time with a cost saving of 18%.*

This LeBlond Lathe provides fifty horsepower; spindle speeds up to 247 r.p.m.; rigid construction. It makes possible latest turning techniques with carbide tools; gives better finish, closer tolerances and greater economy.

Operators' work is easier, too, because of convenient features—single-lever feed control, exclusive *power rapid traverse* and many more.

Whether you turn ten-ton shafts or ten-ounce bushings, there's a LeBlond Lathe to turn them faster, better. Your nearby LeBlond Distributor will tell you about the 50" Heavy Duty and other late model lathes. Call him or write—

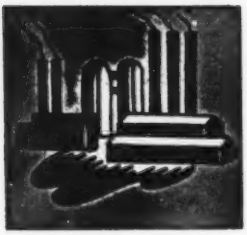
THE R. K. LEBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO

Ask for Bulletin HD-180 for more information on the 50" Heavy Duty.

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MTBB

MARCH 1951

How's Business

Machine Tools

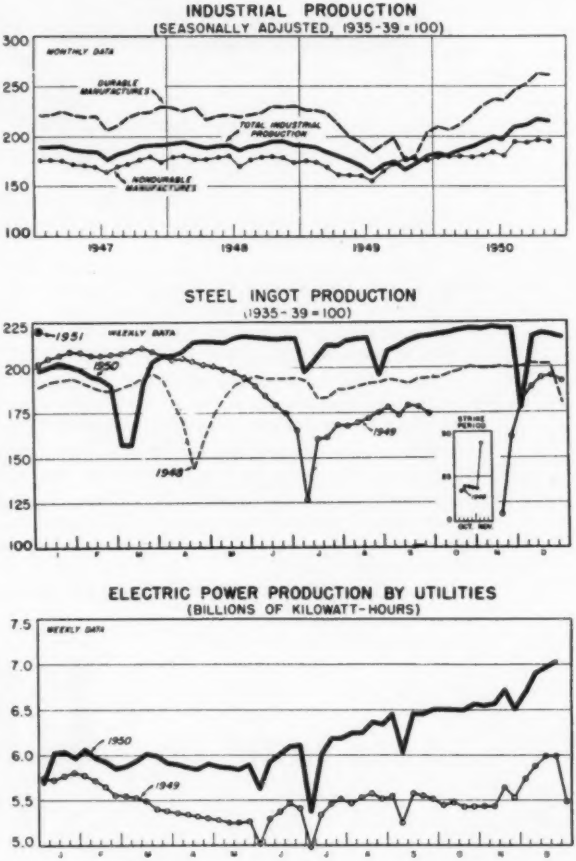
The present backlog of machine tool orders is in the neighborhood of one year, and defense orders have not been placed. When these orders are obtained by builders delivery dates can well be pushed ahead several years. One can already hear the screams and see the pointing finger of scorn if the industry cannot deliver in a couple of weeks. Much of the blame for any resulting confusion and slowness in the industry must be laid to faulty governmental planning.

Builders presented photostatic copies of all orders to the NPA's machinery division. It is hinted in some quarters that this is the first move in a possible activation of phantom orders placed some years ago, and which carry a high priority.

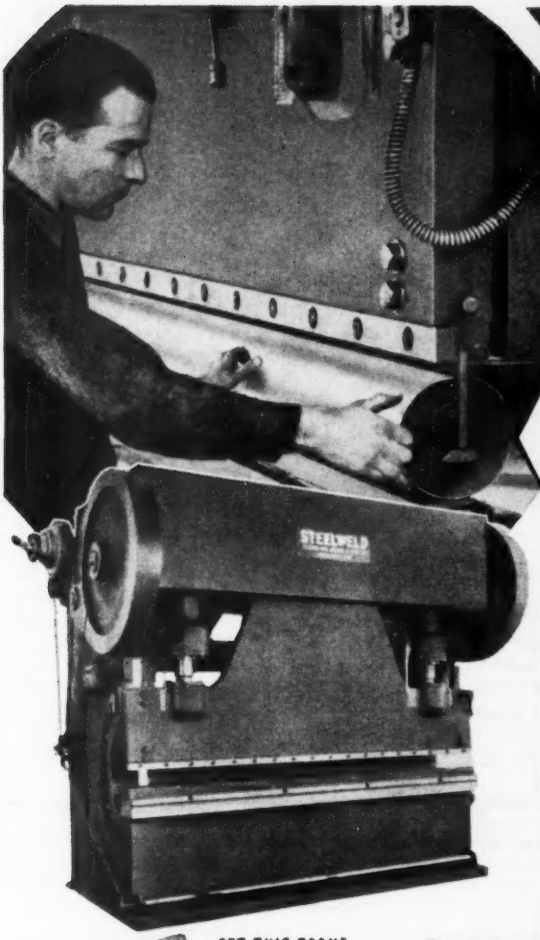
New orders are pouring into builders' offices at a rate of approximately $90 million a month; on a yearly basis this is over a billion dollars a year. Some defense orders have dribbled in the last few weeks.

What is the industry doing to meet the mountain

GENERAL BUSINESS INDICATORS



source: Dept. of Commerce





Forming a 4-inch diameter cylinder on a Cleveland Steelweld Press. Machines can be furnished for forming cylinders in lengths up to 20 feet.

SMALL DIAMETER CYLINDERS QUICKLY PRODUCED

Small diameter cylinders, square and hexagon tubing and other closed shapes are easily made with simple dies on Cleveland Steelweld Presses. Special steel dies are usually used for large quantities, but for small numbers a steel male die and a female pressure pad made of rubber is often used.

A series of successive bends are made starting at the ends of the sheet and finishing with the center bend. The dies are so made that the cylinder or tube when removed from the machine will spring to a closed position.

This is only one of the dozens of different jobs that can be done on any Cleveland Steelweld.



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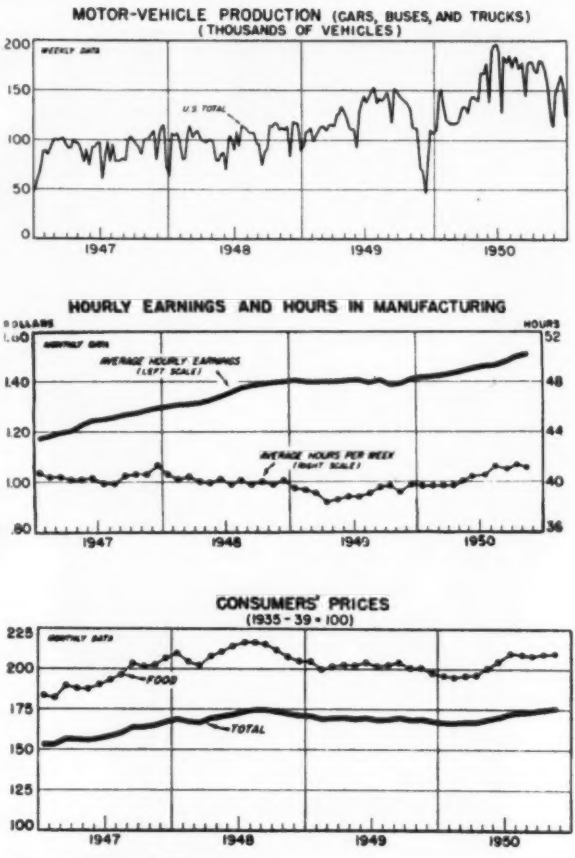
of orders which will engulf them shortly? Some plants have plans for plant expansion programs, others are revamping their layout and assembly floors to handle larger volume more effeciently. It is anticipated that much more subcontracting will be done by the machine tool industry than was the case in World War II. Not only will this help their production schedules but will do much to alleviate a pressing manpower shortage; some builders have already lined up contract shops to handle their work.

Even with the all-out activity of which the machine tool industry is capable, it will be years before normal civilian demands can be met, that is, those without defense orders or priorities.

Confusion in Industry:

Scarcities of some materials have forced some industries to curtail production and reduce the working hours of its labor force. No government contracts are available to take up this slack. This situation has created some confusion among management and producton men. Primary cause of concern is the necessity for laying off men, many of whom will find other employment and will be loath to return to their former employ.

GENERAL BUSINESS INDICATORS



source: Dept. of Commerce

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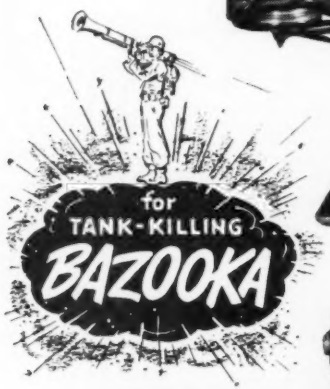
Chrysler, Studebaker, and Packard are curtailing auto production about 20% due to restrictions and materials shortages. Chevrolet's cutbacks will be light in the first quarter and increase in severity thereafter.

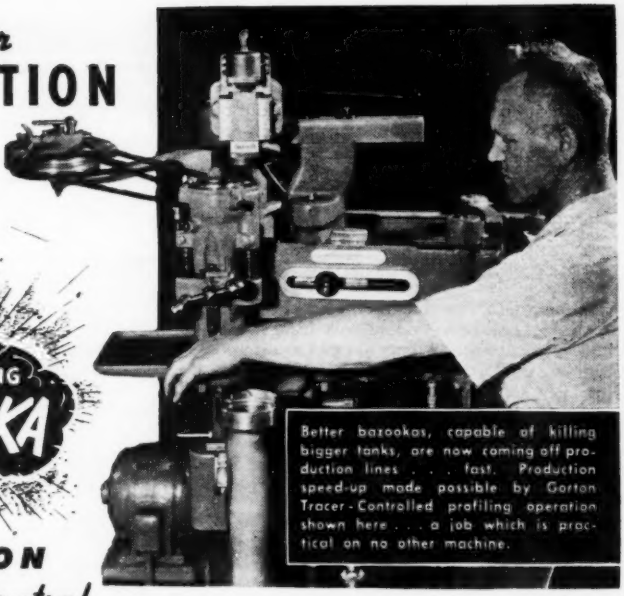
Appliance manufacturers are curtailing production of all types of products. Apex Mfg. Co., Cleveland, has reduced their labor force almost 7%; Westinghouse appliance output is down 15% from December; both General Electric and Hoover are reducing production. Crosley Div. of Avco Corp. has laid off 1000 in December due to shortages.

Critical Materials

It cannot be said that N.P.A. controls of critical materials is working out satisfactorily and it appears that a Controlled Materials Plan, used in World War II is

Faster
PRODUCTION





Better bazookas, capable of killing bigger tanks, are now coming off production lines . . . fast. Production speed-up made possible by Gorton Tracer-Controlled profiling operation shown here . . . a job which is practical on no other machine.

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On many all-but-impossible jobs, Gorton Tracer-Controlled Pantographs and Duplicators speed up production on military or industrial contracts. High surface finish results from spindle speeds up to 45,000 R.P.M. Accuracy results from the use of over-size masters, patterns, or templates together with the reduction ratio which is exclusively characteristic of the pantograph. Whether a dozen or a thousand pieces, each is identical to the first. Work piece size varies from instrument parts to areas of 10 to 20 feet.

Gorton tracer-controlled equipment quickly pays for itself in profiling, routing, die sinking, mold cutting, counterboring, chamfering, grooving, graduating, engraving as well as many other standard or special operations on ferrous or non-ferrous metals and plastics where work is flat, uniformly curved, cylindrical, spherical or irregular in shape.

Mail the coupon below for General Catalog illustrating the complete Gorton line.

PRODUCTION DATA--

JOB: Profile 6 locking lugs for male and female sections of new 3.5" Bazooka

MATERIAL: Aluminum alloy

CUTTER: 5/32" dia. single flute, fast spiral H.S. steel running at 3,900 R.P.M., without coolant

MASTER: 2 masters: one for male and one for female sections; 3 times oversize, traced manually

HOLDING FIXTURE: Pneumatic-operated internal expanding type

APPROX. TIME: 36 pieces per hour

ALTERNATE METHODS: None practical



Please send at once complete information about the Gorton line contained in Bulletin 1655-1403.

Firm .....

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in the making. General Harrison has appointed Walter C. Skuce as staff assistant to direct the Production Controls Staff Organization to organize a centralized control plan. The distribution and allocation of scarce materials will fall under jurisdiction of Mr. Skuce.

Mr. Skuce served in the W.P.B. in the last war as director of the C.M.P. Division.

Re-shuffle in Washington

A new agency, the Defense Production Administration has been created. Purpose of the agency is to consolidate and speed production and other mobilization efforts. Agency will be headed by William H. Harrison, former head of the N.P.A., who now becomes assistant to Charles E. Wilson, Director of Mobilization.

The order which created the D.P.A. further established a Defense Mobilization Board to assist and advise Mr. Wilson on all major jobs. In commenting on the new agency Mr. Wilson said, "The O.D.M. will determine general policies very much like the Office of War Mobilization did in World War II, and D.P.A. will have about the same powers as the former W.P.B."

D.P.A. will do programming but will leave actual administration in the hands of present operating agencies, while the N.P.A. will remain a part of the Commerce Dept. and will continue to issue orders which will come only after approval by Gen. Harrison as D.P.A. head.

Only government contracts, which are under way, can quell this confusion.

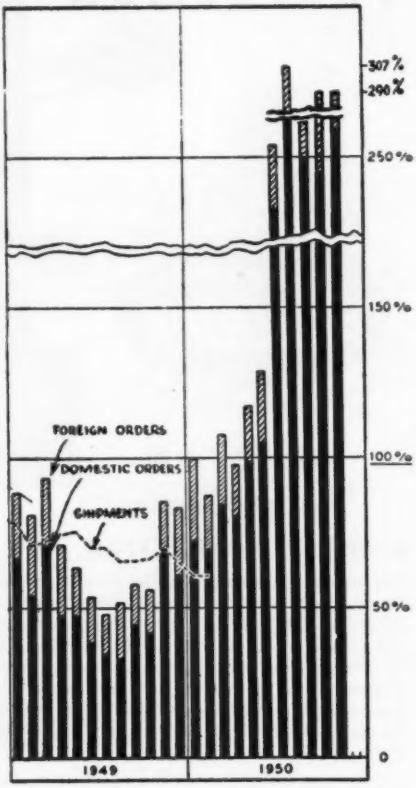
Some auto makers are dismissing their help as they feel a pinch for materials. The pinch is also being felt by appliance manufacturers, and the building industry. Copper will be placed on the critical list March 1st, and it is doubtful if too much of it will be used for non-defense work. However, in spite of shortages, the first half of 1951 promises to outstrip 1949 levels in the production of non-essential products. The latter half of 1951 is anyone's guess.

Power over production loans, procurement, certification of expansion plans for fast tax write-offs have been given to the new D.P.A.

Big Problem

When discussing our military program we must bear in mind one thing which necessarily complicates our thinking: all efforts are being directed to keeping the civilian economy intact, at the same time giving the military what it needs.

MACHINE TOOL SHIPMENT CHART
A quantity comparison chart between 1949 and 1950



source: National Machine Tool Builders' Association

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REPRINTS

Some of the Special Reports on American-built machines, their specifications, types, etc. are still available. Write MACHINE and TOOL BLUE BOOK, 222 E. Willow Ave., Wheaton, Ill.



RIGHT! Postiv-Lok end mills save 25% and up on tool costs on heavy duty end mill applications. They eliminate integral tapered shanks, reduce set-up and change-over time. See your Putnam distributor or write for free bulletin.

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Though offering you all these time and money saving advantages, the initial cost of Rycut is practically the same as that of standard medium carbon alloys!

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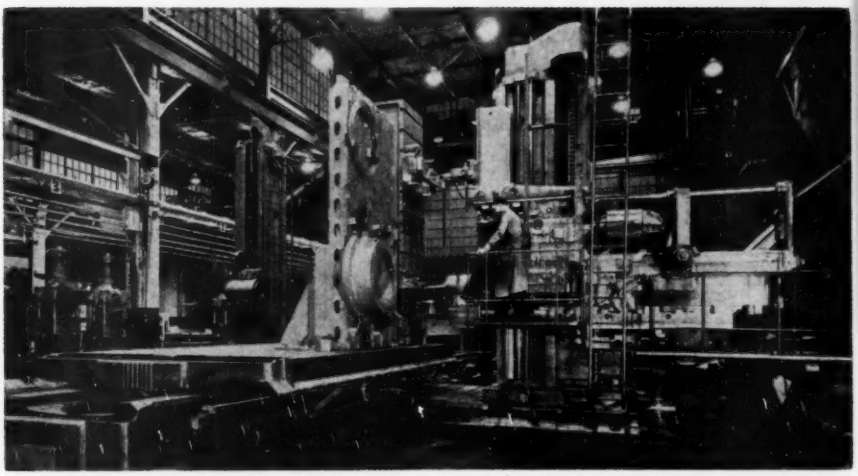
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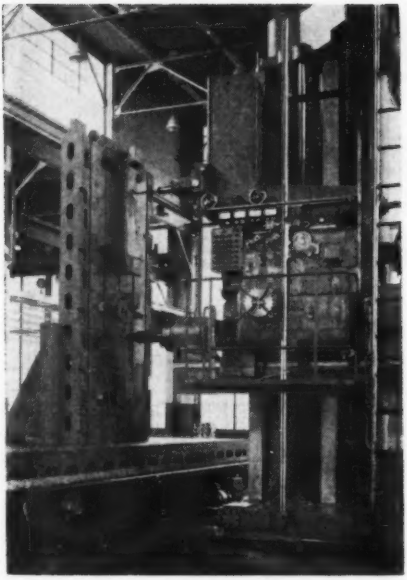
New G. & L. Machine Handles Multiple Operations On Diverse Types of Work

Addition of two important structural features to the Giddings & Lewis planer-type horizontal boring, drilling and milling machine have vastly expanded the working range and capacity of this machine tool which meets the diversified requirements of a large automobile manufacturer. Thus, by adding tracer control to the machine, together with a power operated under-arm ram and spindle support, it is possible to perform a broad range of operations which would ordinarily require several special production machines to complete.

The new machine simplifies handling a wide variety of work. Structurally, it is excellently adapted for the rapid machining of body and fender dies and forging dies; for milling, drilling and boring work-holding jigs and fixtures; for manufacturing special press equipment or press components; for general maintenance of large production ma-



This Giddings & Lewis planer type under-arm horizontal boring machine built is capable of performing numerous precision machining operations on a wide variety of heavy-duty industrial work. The machine is epuipped with a duplicating attachment for die sinking, profile milling and contour machining. Within the range of this single, general purpose machine tool, it is possible to perform the machining operations of several special purpose production machines.



Contour milling a bumper die becomes a simple duplicating operation on this machine equipped with an auxiliary tracer control attachment.

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chines; and numerous other jobs that currently arise in an automobile manufacturing plant.

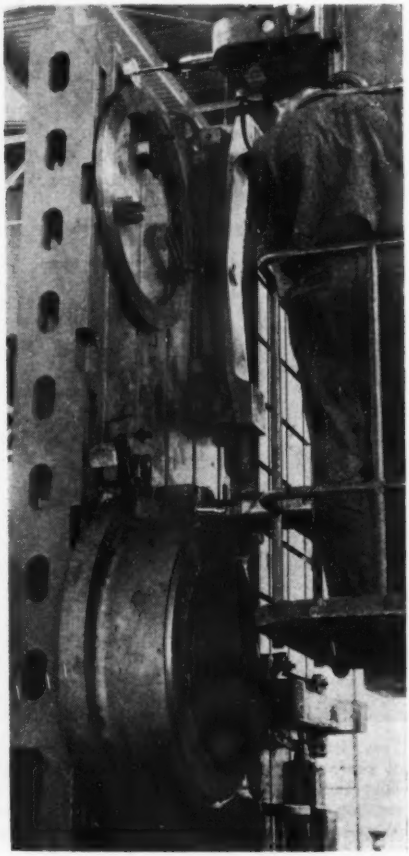
Design of this multiple purpose machine is based upon several major factors, all important in solving the major machining operations involved. Engineering consideration is given to:

1. the size, shape and weight of the part to be machined;
2. the number of settings to complete all machining operations;
3. the overall machining time required to complete the job;
4. the advantages of using a tracer control and a profiling attachment;
5. simplification of machining with the spindle extended and amply supported with an under-arm.

To meet these design factors, it was necessary to take advantage of the standard machine movements and feeds. For example, it is possible to place a workpiece on the 60"x156" machine table and cross feed a full 120". If the part is unusually large or odd shaped, where table overhang might occur, the machine column traverses 48" on its runway at right angles to the table. The spindle end support column also moves on its runway to facilitate table

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Profile milling a circular steel casting is another tracer control operation that can be readily handled.

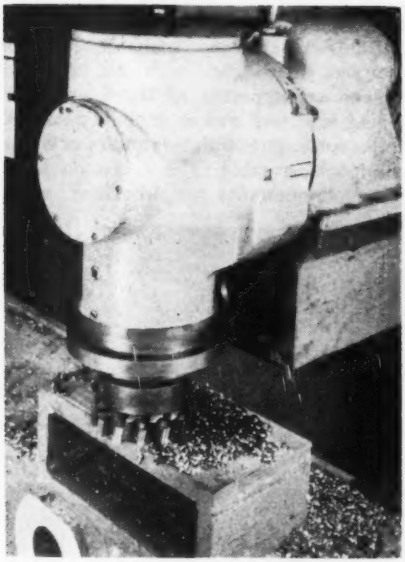


overhang on the opposite side for back boring, back facing, etc. A third movement, that of the headstock on the column, provides a 72" vertical travel above the table.

Standard feed movements, engaged independently or in combination, increase flexibility and make it possible to perform almost any operation on a workpiece in almost any position. Ordinarily, work mounted on the table is rapidly presented to the cutting tool through either table movement or column travel. Regardless of the part size or shape, it is possible to locate the work close enough to the machine headstock so that it is unnecessary to extend the spindle beyond reasonable limits to machine hard-to-reach surfaces.

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With this angular milling attachment mounted on the under-arm, it is possible to perform machining operations on five sides of a cube. Note the mounting of the attachment and the power take-off from the machine spindle.



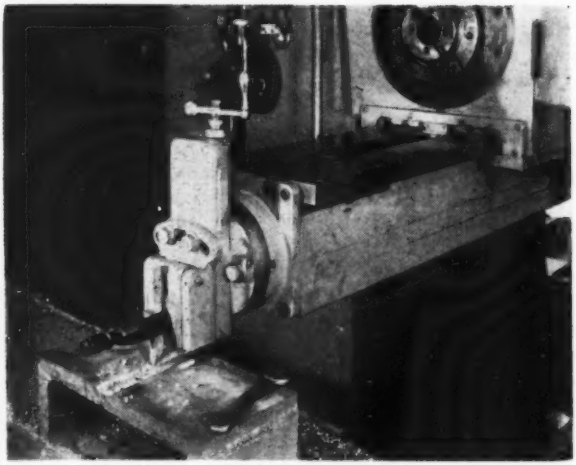
In some instances, however, if it is necessary to extend the spindle to perform "pick-up" operations, it is done by employing the power operated under-arm ram type support, described in later paragraphs.

Ordinarily only one or two settings are required to complete the majority of work routed to the machine. Because the machine bores, mills, faces, backfaces, counterbores, ream drills and taps (all standard operations) by merely changing cutting tools, it is unnecessary to move the work from one machine to another. With the tracer control on the machine, it is practical to profile and contour mill sections or parts of the workpiece without disturbing the setting, eliminating work setups for different machining operations on other machines, as well as errors frequently resulting from clamping and unclamping the work and moving it to different machines.

Under-Arm Ram Type Support

This planer-type horizontal boring machine is equipped with a built-in power operated under-arm ram and spindle support. This under-arm has a travel of 60" and rigidly supports the spindle and auxiliary attachments used for machining at that distance from face of headstock. The under-arm has twenty-one power feeds identical to those of the spindle. Both spindle and under-arm can be operated independently, or engaged for simultaneously feed.

Used independently the under-arm simulates a shaper ram, and when equipped with a clapper box shaping attachment, readily performs pick-up machining operations on large- cumbersome parts which might create unusual setup problems if changed from the original setting. The shaping attachment is especially useful to machine pads and bosses, and to cut key-



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Using the power operated under-arm ram for a shaper operation.

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ways, slots, etc. Or, when the ram is equipped with a plain angular milling attachment, it is possible to machine internal and external surfaces that might create a problem on other types of equipment. Simple broaching and press fitting operations are other practical functions of the ram.

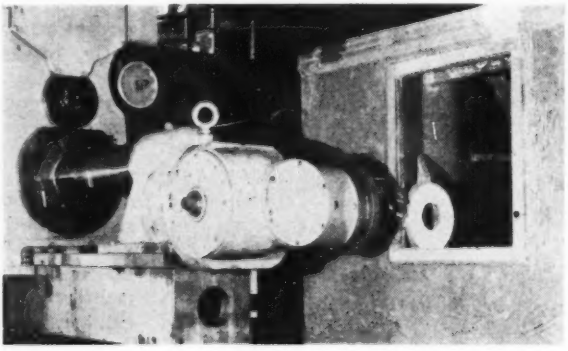
The machine spindle is extended to drive these milling units and is amply supported by the under-arm.

To prevent spindle deflection when it is extended to its extreme length, an anti-friction roller bearing spindle support is placed on the ram. This unit makes it possible to perform accurate boring, milling and drilling operations with the machine spindle when the latter is extended five feet from the headstock face.

Duplicating Attachment for Body Die Work

An electrically operated tracer control is used as auxiliary equipment and operates the different machine units to complete this work.

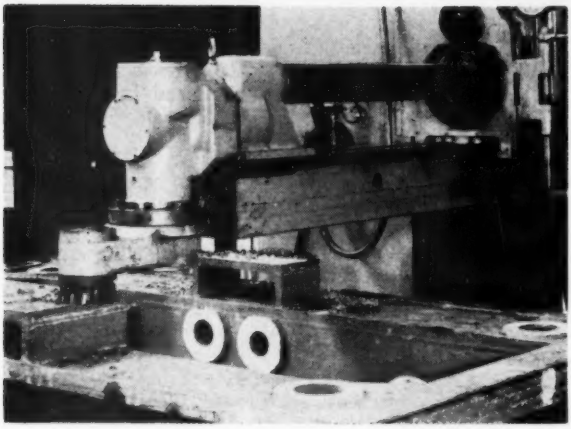
Open construction of the horizontal boring machine makes it highly suited for mounting templates and work on the machine table. There are no machine components to interfere with



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Profile milling using standard machine feeds. This is the opening in a large press crown. Angular milling attachment is easily adjusted to the job requirements.

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Additional reach is obtained for occasional work by using the offset spindle 90° angular milling attachment. Combination of horizontal and vertical rotation of this attachment makes it possible to machine at practically any angle.

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work mounting. This feature permits a broad latitude in the type of contour work that can be handled effectively.

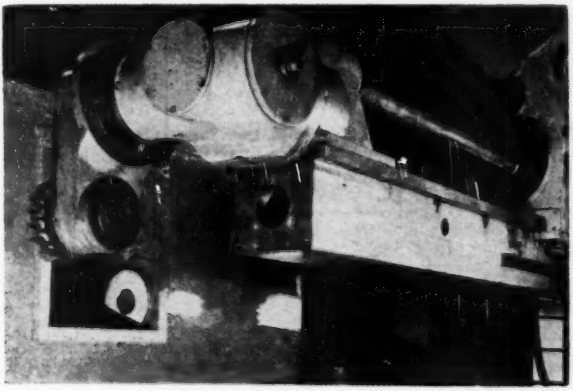
The tracer control attachment is provided with a ball swivel type arm and tracer tip. The latter contacts and follows the template guide. Sliding adjustment of the tracer arm on a vertical holding column, which is mounted on the machine headstock, enables the operator to make easy setup adjustments. Also, this arrangement makes it possible to use the full vertical headstock movement of the machine. This feature, coupled with the table cross feed, provides an unusually wide work pattern.

In operation, the tracer arm tip contacts the template from either the end or side, and activates the motors which provide power for the different machine foods. These include vertical headstock feed, table feed and column feed. All respond instantaneously to the tracer control mechanism. Through this auxiliary machine attachment it is practical to perform duplicating work of almost any size, small or large, which

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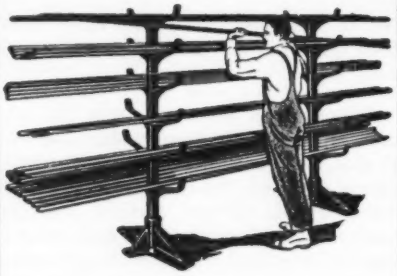
The machine spindle at its extreme extension receives support from this anti-friction bearing.

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would ordinarily be assigned to equipment designed only for one particular range and class of work.

Machine Elements Used in Basic Design

The new planer-type under-arm machine is an ingenious arrangement of proven Giddings & Lewis standard machine elements combined to give unusual work handling capacity. The machine headstock, column, column runway and end support column and runway are similar to the components used in the standard No. 560 planer type horizontal boring, drilling and milling machine. However, the headstock is modified to receive both the tracer control attachment and the under-arm support. Also, machine controls and motors are arranged for the infinite requirements of the duplicating attachment.

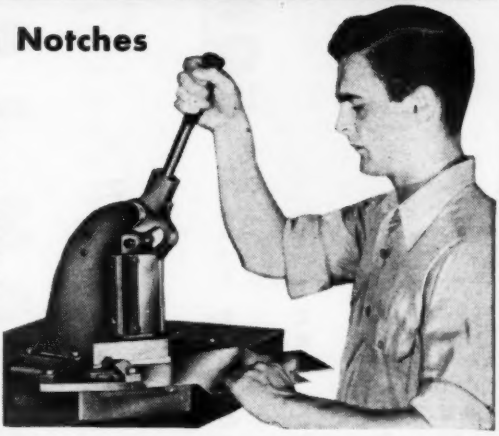
The table is especially suited for holding large workpieces. Open mounting of the work on the table speeds setups, for there are no interfering machine structures to complicate the settings. This feature makes elaborate and costly holding fixtures unnecessary.

Arrangement of the various machine elements makes it possible to obtain maximum usefulness through the extensive feed movements already mentioned. All regular features of G. & L. equipment characterizes the new machine. These include: two spindles, one **low speed** for heavy duty work and the other, **high speed** for sensitive drilling and tapping; speed and feed selectors; synchronized movement of headstock and end support block to insure positive bar alignment; complete safety devices for all traversing units; and numerous other features equally important. Controls for this machine are conveniently located, enabling the machine operator to watch all cutting operation without difficulty. THE END.

THE di-acro NOTCHER

Duplicates Precision Notches WITHOUT DIES!

The new precision DI-ACRO Notcher is so fast and easy to operate that it is no longer necessary to invest in dies and set up a punch press for many production notching operations. It can be so quickly adjusted for any size or shape notch within its capacity that it is also ideal for experimental or research work. Many straight shearing operations are also possible with this unit.



CUTS CLEAN—NO BURRS OR ROUGH EDGES

The powerful action of the DI-ACRO Notcher results from an exclusive DI-ACRO designed roller bearing cam which provides a tremendous pressure with a small amount of effort. The precision-ground Vee-shaped ram and blades of alloy tool steel assure clean cuts and permanent accuracy in production runs of duplicated notches.

LARGE CAPACITY. The DI-ACRO Notcher will cut 90 degree notches up to 6 by 6 inches in 16 gauge steel in one operation. Larger notches, and wider or narrower angles, can also be cut. A built-in flexible gauging device quickly locates a notch in the desired position and duplicates it exactingly.

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ENGINEERS — DESIGNERS — PRODUCTION MEN should all have this informative catalog which contains technical data covering Di-Acro Benders, Brakes, Shears, Rod Parters, Notchers, Punches and our offer of "Die-Less Duplicating" Engineering Service. **WRITE FOR YOUR COPY TODAY.**

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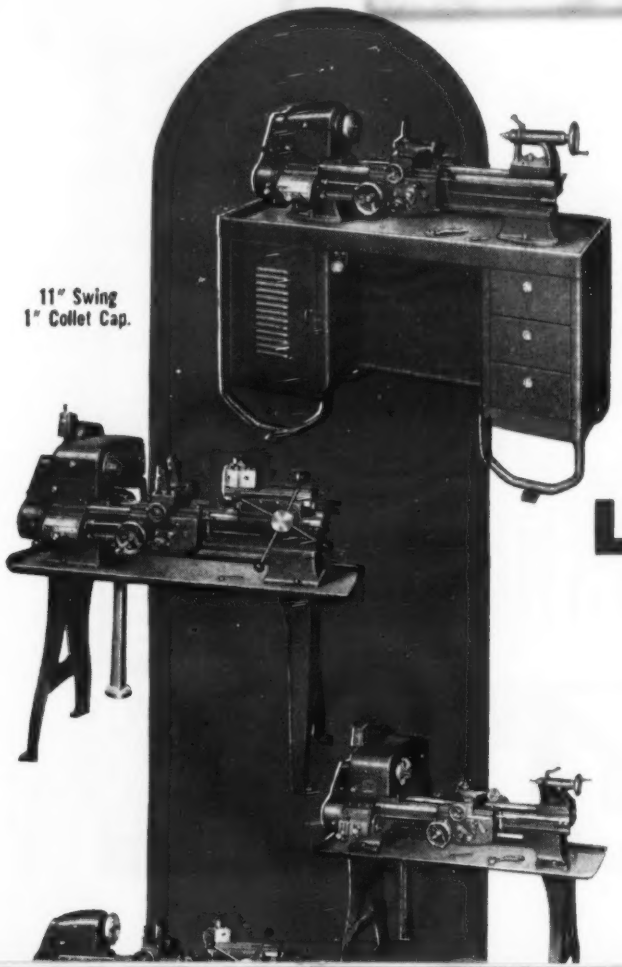


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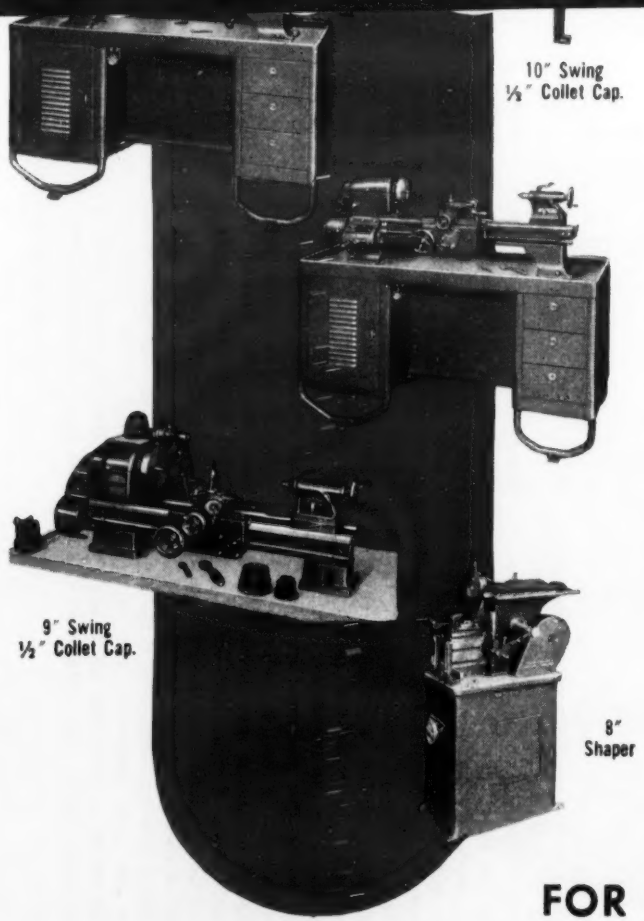
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REDUCED *Vibration with Resilient Mountings*

BY FRANCIS A. WESTBROOK

There are two problems in vibration: one is to eliminate, or isolate, vibration which is generated within the machine itself; and the other is to isolate the machine so that it is not affected by vibrations in the building. A number of actual case histories of the use of resilient mountings in machine shops are discussed.

Internal vibration is overcome to a great extent by the precision balancing of all rotating parts, and this procedure should of course be carried out as far as practicable. There is, however, at times a residual vibration which it is not practicable to eliminate, however, it is desirable to minimize the transmission of this vibration to the building by the use of resilient material in the mounting. Such resilient material in the mounting is also used to isolate the machines from external vibrations. Of course, a properly designed mounting may serve to isolate both types of vibration.

Precision balancing is largely a matter of machine design and that of providing suitable mountings is mainly up to the plant engineer. The following discussion is about the latter, and consideration of a few examples taken from actual practice will show what is being done.

The Fellows Gear Shaper Co. of Springfield, Vt., has equipped all of the measuring instruments in its cutter inspection department with rubber shock absorbers. Fig. 1 shows a Fellows involute measuring instrument which, in its own plant, the company mounts on rubber cups 2¾ inches in diameter. Fig 2 shows a lead measuring instrument which is also equipped with rubber mountings. This machine is considerably heavier and has a larger base than the former, so it is provided with mountings ⅞ inch by 1½ inch by 4½ inch in size.

In its plant this same company is also using molecular vibration absorbers which it has found satisfactory for high frequency vibrations, but they say that they do not respond to sudden

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BOSTON Decatur 2-2332	DALLAS Riverside 5138	HARTFORD 32-5197	MILWAUKEE Division 2-0204	PITTSBURGH Hiland 1-8548	SEATTLE Elliott 0052
BUFFALO Delaware 7634	DAVENPORT 7-9544	HOUSTON Wayside 1530	MINNEAPOLIS Bridgeport 2792	READING Enterprise 1-0551	SYRACUSE 3-0334
CHICAGO Ambassador 2-1000	DENVER Tabor 0444	INDIANAPOLIS Riley 3946	NEWARK Mitchell 2-8332	ROCKFORD Enterprise 2504	WAUKEGAN Ontario 5220
		KANSAS CITY Baltimore 1700	NEW YORK Flushing 3-0027	ST. LOUIS Newstead 3110	

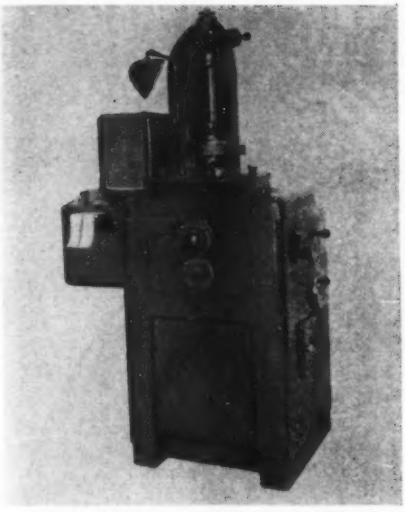


Fig. 1. Fellows involute gear measuring instrument equipped with rubber shock absorbers to isolate it from vibration.

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heavy shocks, such as a truck rolling along the floor, as well as the rubber mountings.

The Columbus Bolt & Forging Company of Columbus, Ohio, has installed treated felt pads under several of its direct-driven machines, including bolt headers, roll threads and tabulating machines. The company experimented with these pads primarily for the reduction of noise and vibration, and also as a means of anchoring the machines to the floor. They have been found to be very satisfactory and of lasting effectiveness.

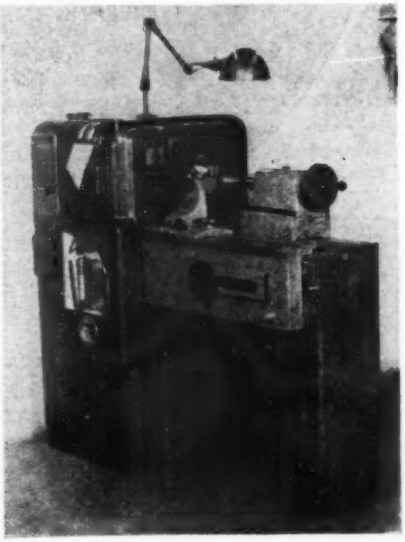
To anchor the machines to the floor the pads are covered on each side with a special oil and waterproof cement. That is, the pads are cemented to the floor on one side and to the base of the machine on the other so that there is no direct contact between floor and machine, which minimizes the transmission of noise and vibration. This holds the machines securely in place, and after two years, or more, no failures or trouble have been experienced with this type of anchorage.

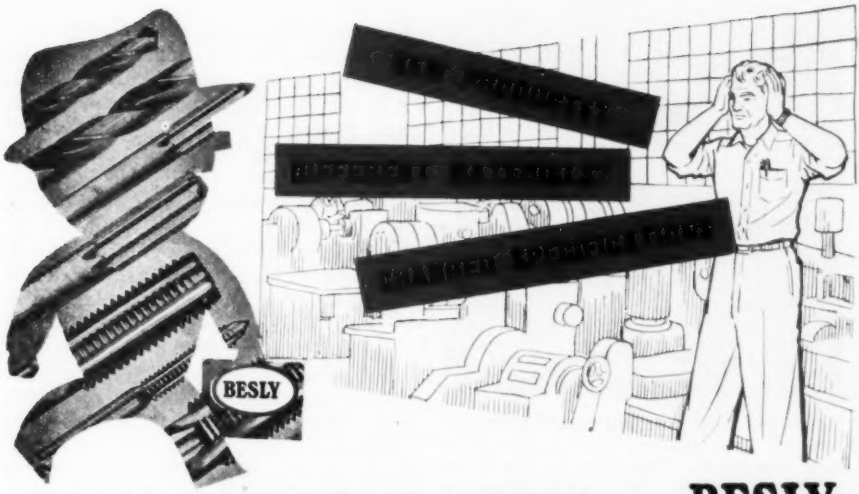
Cementing the machines to the floor in the above manner has the added advantage that when it is desired to change their location the cement is readily loosened by a suitable solvent and the floor is left undamaged, which would not be the case where bolts or lag screws are used. Experience in many plants has shown that this method of anchoring is also a definite saver of time and labor, amounting to from 60% to 75%.

Bryant Chucking Grinder Co., also of Springfield, Vt., recommends a method of mounting its machines for the grinding of fine finishes which is somewhat different in detail although perhaps not in principle. Internal vibration is minimized by precision balancing of all

• • •

Fig. 2. Fellows lead measuring instrument which is mounted on rubber shock absorbers.





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UNSURPASSED ACCURACY at *all* vital points

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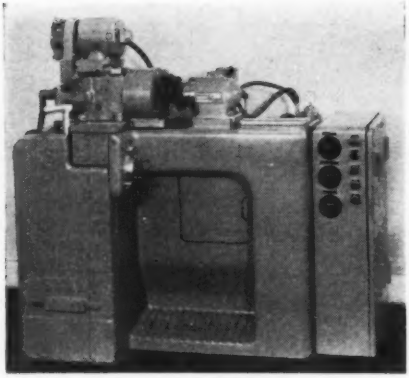


Fig. 3. Internal grinding machine is mounted on a concrete block resting on a cork foundation. This reduces the transmission of external vibrations to permit the grinding to extreme tolerances.

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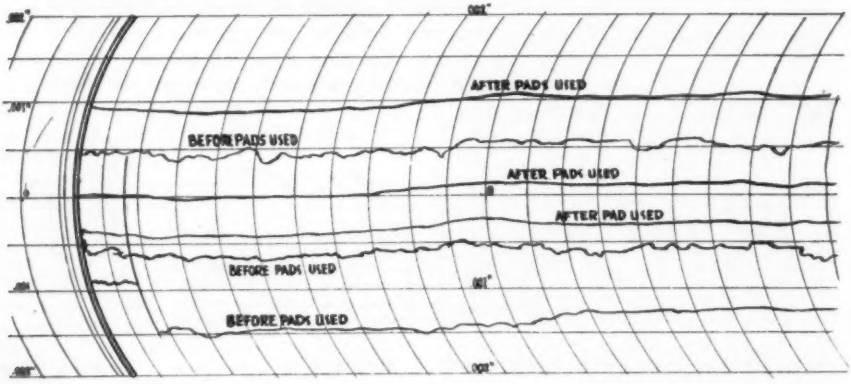
rotating parts. The entrance of external vibration is practically eliminated by setting a large concrete block on a foundation of cork bricks in a concrete-lined pit. There is a free air space around all sides of the block except at the floor level where there is a line of cork bricks cemented in place and covered with mastic to prevent the entrance of dirt and other foreign materials into the air space. When the machine is set on the concrete block it is well isolated in a manner which has proved to be very satisfactory. A machine of the type so mounted is shown in Figure 3.

Figure 4 shows a very interesting graphic record of the reduction of transmitted vibration by placing pads made of rubber and fabric under a Michigan involute gear checker in a shop in Illinois. The gear to be checked is placed in the machine and a contact is placed on one of the gear teeth to be checked to determine its condition. A dial indicator connected to this contact shows any variation which may exist on the face of the gear tooth. If a permanent record is desired an electric recording device can also be attached to the contact.

The irregular lines seen in the graph in figure 4 shows the vibration transmitted to the gear checker machine from the floor before the pads were installed. After installation of the pads the record shows smooth lines with slight variations caused by slight variations in the face of the gear tooth. It is obvious that without the pads it

• • •

Fig. 4. Graphic record of vibration transmitted from the floor, with and without rubber and fabric pads, to a gear checking machine.



FINISH WELDS FASTER with the CLECO 1480-A PNEUMATIC EDGE GRINDER



Here is the fastest and most economical tool ever developed for finishing off welds, cutting out defective welds, etc. It is especially useful for cleaning up stainless steel welds.

Users have reported that finishing costs have been reduced as much as 40 percent by using the Cleco 1480-A. Write for bulletin EG-349.

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would be impossible to distinguish variations caused by irregularities in the face of the gear teeth from those caused by vibrations coming externally from the floor. Three tests without pads and three with them are shown in this figure and the significant point is the corresponding comparison between the irregular lines, not their position on the chart.

This involute gear checker weighs 3000 pounds and has three feet. The pads are ⅝ inch thick. Two are 4 inches square and one 3 inches by 6 inches in size, making a total of 50 square inches, or a loading of about 60 pounds per square inch. The machine is not bolted to the floor. Such pads give years of service without deterioration.

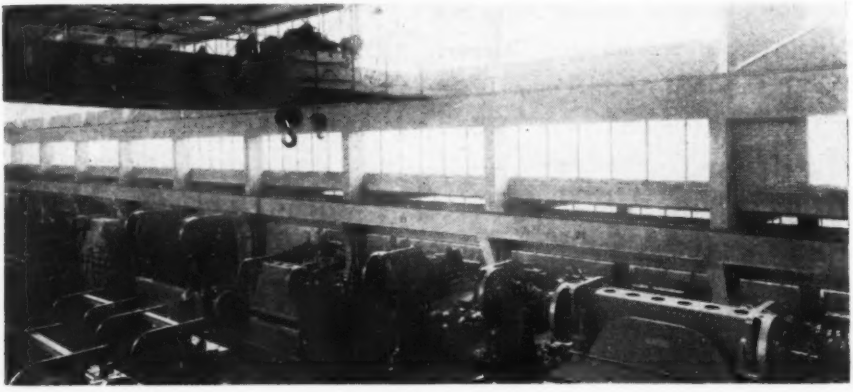
A serious source of disturbing vibration in many machine shops comes from the operation of overhead traveling cranes. This can be minimized and made unobjectionable as a general thing by providing padding made of rubber and fabric under the crane rails. The straight bolts, or hook bolts, holding the rails in place should have resilient washers of the same material to complete the isolation of vibration.

A specific crane rail padding job with the same resilient material, at the Cincinnati Shaper Co., is seen in figure 5. In this case there are two craneways, one above the other, supported by the same pillars. Two 25-ton cranes operate on the upper tracks and two 5-ton cranes on the lower. The upper craneway is the only one padded. When a 5-ton crane, without padding under the rails, is run it is possible to feel a slight shiver by holding the hand against the base of the column, even when the crane is three or four bays away. When a 25-ton crane, with padding under the rails, is run it is difficult to tell whether or not it can be felt in this way when directly overhead, or several bays away.

The pads used for this installation are 4 inches by 10 inches in size with a spacing of 18¾ inches on centers. The resilent washers are 1¾ inches outside diameter by ¾ inch inside diameter and are placed on top of the rail clips which hold the rails in place. The thickness of both pads and washers is 15/64 inch, and 640 pads plus 1280 washers were used. Eighty pound

• • •

Fig. 5. The upper of the two craneways on which 25-ton cranes travel have resilient pads under the tracks to minimize the transmission of vibration.



ROTOR SCREW DRIVERS
MAGNETIC BITS
"PAID OFF" IN ONE WEEK



THIS manufacturer of metal cabinets found a lot of time was being taken to insert and drive screws in locking bars with hand screw drivers. Some screws were loose, others so tight that bars buckled, others were difficult to reach.

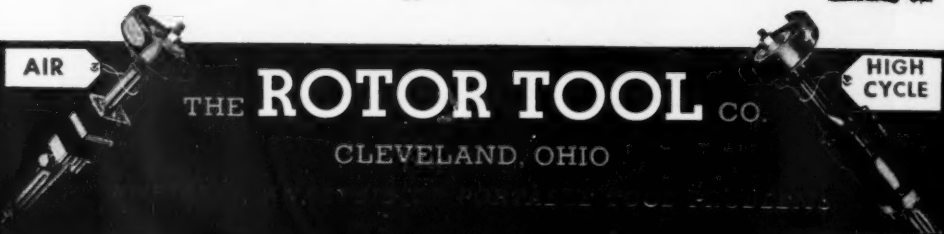
The Rotor Application Engineer suggested Rotor Midget Screw Drivers that have double-cushioned clutch (for torque control) and magnetic bits (to hold screws in while inserting in the hard to reach places.)

Results? Over 40 man-hours saved per week. The labor savings *alone* "paid off" the tool costs in the unusual time of *one week.*

Want to study *your* methods for similar benefits?

Call in the Rotor Tool Application Engineer or write for Catalog #35.

AIR O'TOOL



THE ROTOR TOOL CO.

CLEVELAND, OHIO

rails were employed for this installation.

One of the large steel plants uses resilient material in continuous strips under the crane rails of the same width as the rail flange. It has been found that this prevents battering of the rail ends and also protects the plates. In addition, the life of the bearings of the crane carriage is very materially prolonged. It furthermore reduces the transmission of vibration to the surrounding structures and to those portions of the plant where there is machinery, or where other operations take place on which vibratory disturbances have a bad effect. Crane loads of 60,000 pounds running at 900 feet per minute are not uncommon here.

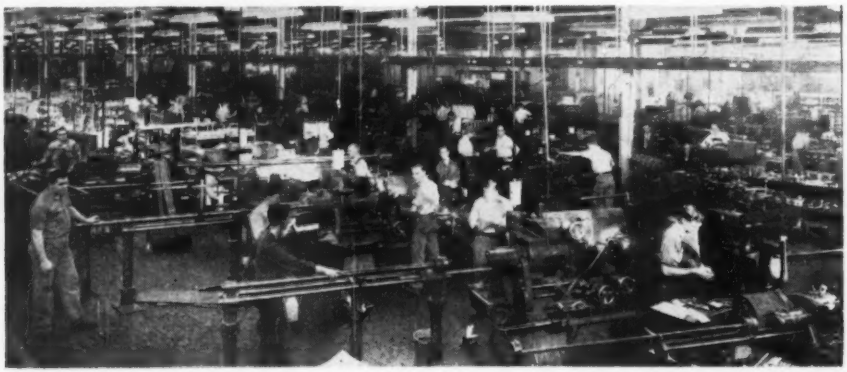
In another large shop the crane girders are of concrete on top of which there is placed a ½ inch thick by 19 inch wide metal plate for the full length. The 60 pound crane rail sets on ⅜ inch thick rubber and fabric padding, held in position in a 16 gauge metal trough extending the full length of the girder. The rail is fastened by hook bolts. This arrangement has also given satisfactory results and goes to show how different local conditions can be met successfully by different, but in reality simple, methods of installation. Other concerns make consistent reports on the advantages of using resilient pads, including the reduction of noise.

A manufacturer of screw machine products in the Middle West has had an interesting experience in vibration isolation. This concern had a centerless grinder near a large vertical broach and it was noted that the vibration produced by the broaching operation was being transmitted to the grinder. This resulted in a slightly chattered surface on the work being ground. Resilient pads made of rubber and fabric were cemented to the floor and to the base of the grinder, and did a satisfactory job of isolating the grinding operation from the vibration of nearby machines.

The same company uses various makes of resilient pads for mounting many types of machine tools, although vibration absorption is not the principle consideration. In this plant it is frequently necessary to move machines from one location to another, and the factory manager prefers to anchor them

• • •

Fig. 6. Interior view of the Utica plant of Chicago Pneumatic Tool Co. where all machines have resilient mountings.



by means of cemented pads rather than to drill holes in the cement floors which is costly in time and labor and is also damaging to the floors.

Chicago Pneumatic Tool Co. has installed approximately 350 machine tools on resilient pads since it moved its Cleveland plant to Utica about a year ago, and at the present time the company is in the process of installing 350 more machines in Utica from its Detroit factory. Figure 6 shows interior views of this large shop. The following list of machines already mounted on the pads will give an idea of what is being done:

Automatic screw machines: National Acme, Cleveland Automatic, Foote Burt and Warner & Swasey.

Turret Lathes: Warner & Swasey, Gisholt, Bardons & Oliver, Potter and Johnston.

Drill Presses: Single spindle and double spindle made by Warner & Swasey, Allen, Avey, Delta and Natco.

Milling machines: Cincinnati, Sundstrand, Kearney & Trecker.

Heald BoreMatics.

Gear Cutters: Gleason, Fellows, Barber-Colman.

Grinders: Cincinnati, Heald, Norton, Blanchard.

Treated felt pads are used for all of these mountings. All of the pads are ½ inch thick but pads treated in different ways are used for the various weights per square inch they must support. In installing these pads the recommendations of the manufacturers are followed as closely as possible and the results have been uniformly good.

The dimensions of the pads are determined by the area of the bearing surface plus an extension of approximately ½ inch beyond the bearing surface. For example, if a machine weighing 5000 pounds has four bearing plates, or pads, about 4 inches by 6 inches in size, the total bearing surface is 96 square inches and the weight on the pads is about 52 pounds per square inch. Pads of the proper type to carry this weight, and 5 by 7 inches in size, are used so as to give the ½ inch extension beyond the bearing surface.

THIS ALUMINUM QUIZ IS ON THE HARD SIDE

by Professor Herman Reichardt, Consulting Engineer

There's nothing light about this little quiz on drawing aluminum. If you answer 8, 9, or 10 correctly, counting 10 points for each answered, you're doing well. If you answer 5, 6, or 7 correctly you're still doing well. If you answer 3 or 4, you're doing fairly well. If you answer none, or 1, or 2 . . . well, you'll probably do much better machining the stuff.

1. Drawing larger pieces of aluminum are most satisfactorily done in _____ action presses.
2. When drawing nonheat-treatable alloy sheet the severity of the draw determines the _____ to use.
3. Annealed sheet is used for _____ draws.
4. When sheet is the soft temper variety the shell should be heat treated at _____ degrees before aging.
6. _____steel tools give the finer finish to drawn aluminum.
7. Flow of aluminum at corners must be controlled to prevent. _____.
8. _____ gages of aluminum have a tendency to wrinkle when drawn into hemispherical shapes.
9. 70 percent paraffine and 30 percent mutton tallow lubricant is advisable in _____ draws.
10. Drawing tools should be designed that the _____ thickness of the sheet will be changed very little.

Answers to quiz on page 273

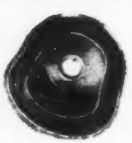
Two general methods of installation are employed. In one of them metal shims are placed between the floor and the pad to level the machine. In the other method, where the machines have leveling screws, a ½ inch plate slightly smaller in area than the pad area, and having a countersunk hole to receive the leveling screw is placed on top of the pad. In all cases cement is used on both sides of the pad and on metal shims where the latter are used.

To date it has been found that machines which were very difficult to keep from walking even when lagged to a concrete floor have given no trouble in this respect when mounted on pads as described. One of the main reasons for using the pads, says the assistant plant engineer, is the ease of installing the machines. It was found that the company millwrights can install a machine in approximately one-fourth of the time that it took them to install one by lagging to the floor. Also, there is no necessity for drilling holes in a new floor which, in the majority of cases, would mean going through 2½ inches of wood block before entering the concrete. As the machines are moved frequently this results in very considerable savings in time and labor, and, furthermore, keeps the floor in good condition.

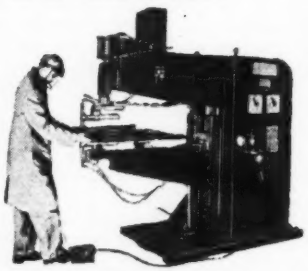
Thanks are extended to the following companies, not mentioned in text, for their help in supplying material and photos: U. S. Rubber Co.; Chamberlain; The Felters Co.; Fabreeka Products Co. The End.

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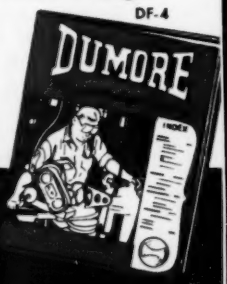
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HOW ONE manufacturer uses new dy-chek inspection method

By FRED M. BURT

Byron Jackson Company is using the simple, fast new Dy-Check method of inspecting bulky parts used in the manufacture of turbine and centrifugal pumps.

The paraphrasing an old saying, "An ounce of looking may be better than a ton of fixing", is by way of advancing the proven fact that a new technique of inspection in the Pump Division plant of Byron Jackson Co., Los Angeles is resulting in major savings in time, materials and cost. Byron Jackson uses heavy, bulky parts in the fabrication of high capacity turbine and centrifugal pumps. Previously they often could not be inspected properly until they had been machined, assembled and placed in work and then subjected to hydrostatic tests.

This problem was satisfactorily solved by the installation of the new Dy-Chek process, a dye penetrant method of inspection, a recent development of the Northrop Aircraft, Inc., for the inspection of complex components of high performance gas turbines. After about 18 months of testing in the gas turbine applications, and on welds, castings, forgings and machined parts, Dy-Chek was found to offer broad fields of advantageous use in industry.

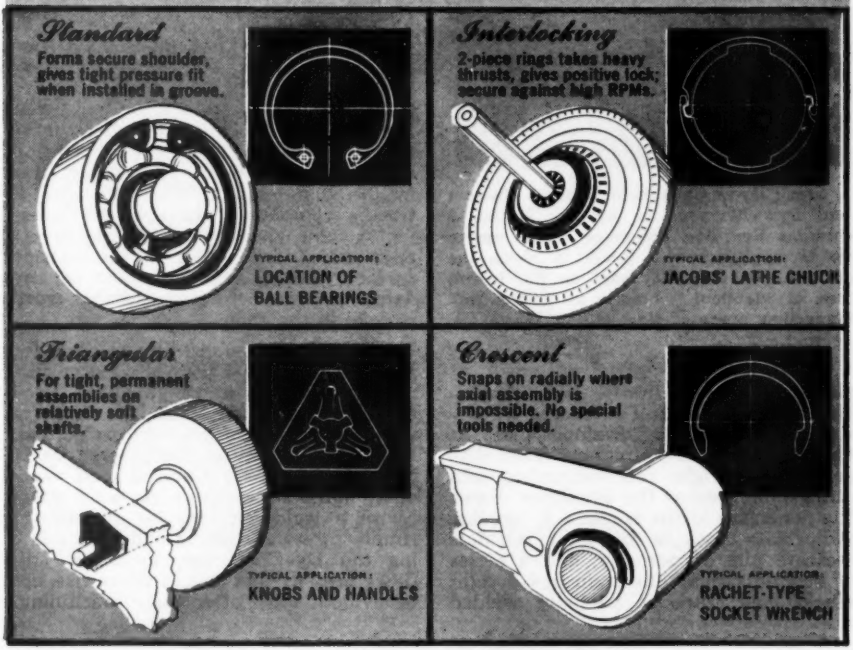
Due to the ease and speed with which these tests can be made, Byron Jackson checks certain indicated parts right at the receiving dock, so that defective units can be disposed of without further handling or plant travel.

This is possible due to the easy portability and application of the Dy-Chek liquids, equally effective on all ferrous and non-ferrous metals, formed in any shape, and on any area that can be reached and seen; even on any part of a weldment that is non-porous and scalefree whether smooth or not.

The three Dy-Chek liquids are non-corrosive. First is the Cleaner and Dye Remover which can be used to loosen dirt, oil or grease, followed by wiping clean with a rag or waste. Then the Dy-Chek red Dye Penetrant is painted on by Byron Jackson workmen with a brush and allowed to stand for at least five minutes. Application is made to all suspected areas, large or small. (A gallon of penetrant will cover more than 3,000 sq. ft.) The Penetrant seeps into any surface opening or discontinuity, no matter how minute.

Next all visible dye is removed by swabbing with the cleaner, using care to thoroughly clean all holes and threads in the area to be tested. After the short drying time required, Dy-Chek Developer, a white liquid, is

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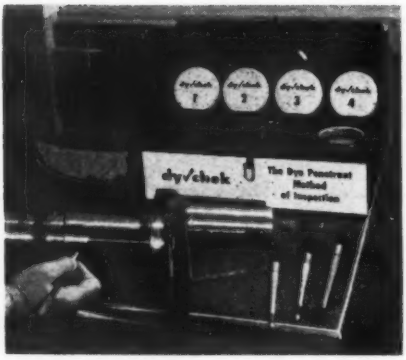


WALDES

TRUARC RETAINING RINGS

WALDES KOHINOOR, INC., 47-16 Austel Place, Long Island City 1, N.Y.

WALDES TRUARC RETAINING RINGS ARE PROTECTED BY THE FOLLOWING PATENT NUMBERS: U. S. PAT. 2,382,948; 2,420,921; 2,411,761; 2,487,803; 2,487,902; 2,491,306 AND OTHER PATS. PEND.



1. Small Dy-Chek kit with Surface Cleaner and Dye Remover in jar No. 1. No. 2 contains Red Dye Penetrant which operator is applying with brush to clean the surface. No. 3 is the same as No. 1, two jars of identical solutions to "stationize" inspection process. No.4 is the White Developer.

• • •

painted on in as thin a coat (preferably) as will give full coverage. Watching the area as the Developer dries, at the point(s) of any crack or other discontinuity, bright red indications will quickly be seen as the developer draws the penetrant to the surface. A red line indicates a crack or cold shut; red dots indicate pits or porosity; and a series of red dots in a line indicates a tight crack, cold shut, or partially welded lap. From the amount of dye showing, the extent of the opening may be estimated.

In casting certain Byron Jackson pump housings, the supplying foundry uses cores for inside surfaces and these cores are held in place with chaplets. Where a chaplet goes through the wall of the casting, if there is not a solid bonding of the chaplet, there might be a flaw that has not previously been detectable until after machining, by hydrostatic testing. Now, at the receiving dock, red penetrant is applied to the inside of the housing, which is more than an inch thick in some places. If there is any flaw in the casting, due to the high capillarity of the dye it travels completely through the housing to show vividly in the white developer which is applied to the outside surface. This enables rejection of any defective units before any further work is done in the shop.

BJ checks brass and bronze parts for porosity with Dy-Chek; also pump impellers for good seating. Vanes are fused to the shroud and to the hub. If there is not a solid jointure, vane to shroud, Dy-Chek points it up. In the large welding department Dy-Chek is used variously and frequently as the solid quality of a weldment can be determined simply by wirebrushing and then making the Dy-Chek test, to detect any flaws present that would otherwise not be evident until after some machining.

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2. Bins near BJ receiving dock for parts to be given Dy-Chek tests. Large pump housings in right bin were rejected due to defects shown by Dy-Chek.



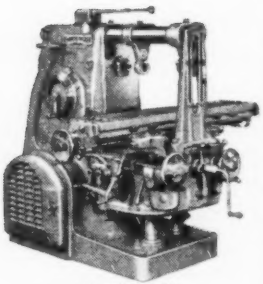


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A new line of knee-type milling machines

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Milling Machine

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New CK columns give you greater rigidity. Compared to former columns, they give you 1000 pounds more metal in heavier ribbing, in box-type, sponson construction to absorb vibration from heaviest cutting loads.

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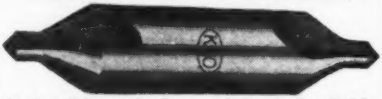
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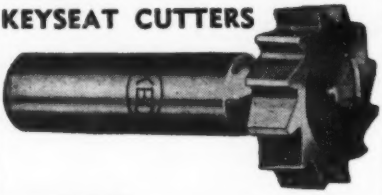
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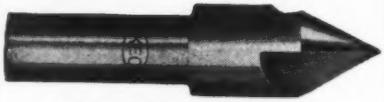
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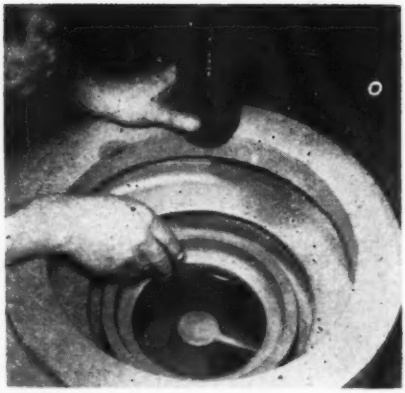
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3. Red Dye Penetrant applied to inside surface of cast pump housing.

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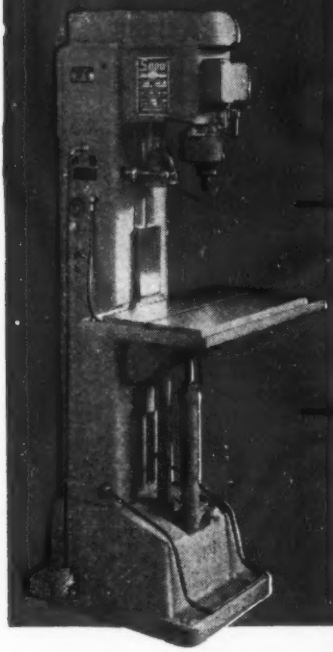
Parts-in-process can similarly be inspected at any time at any place on the production line, to give a large return in quality of inspection with a very small investment in time and cost. According to BJ metallurgists, they have

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4. High capillary penetrant applied to inside surface of housing reveals itself in white developer applied to outside surface to detect porous condition which would have developed a leak under hydrostatic test after machining and assembly.



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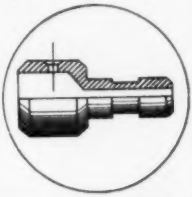


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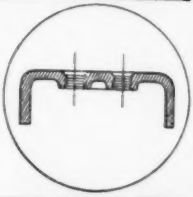
DRILLING



Crossdrill and C'T" Sink 1/16" Hole

Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine

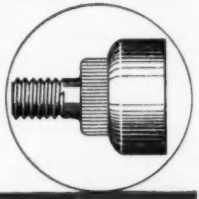
TAPPING



Tap Two #10-32 Holes

Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine

THREADING



3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine

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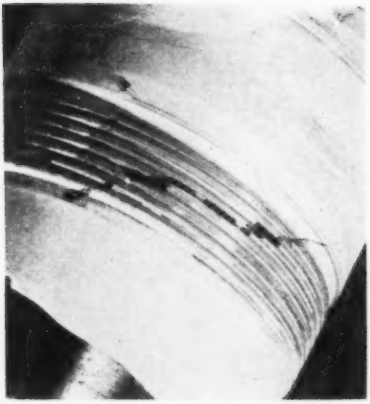
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5. Fissure in crankshaft detected in a few minutes time with portable Dy-Chek kit at Byron Jackson receiving dock.

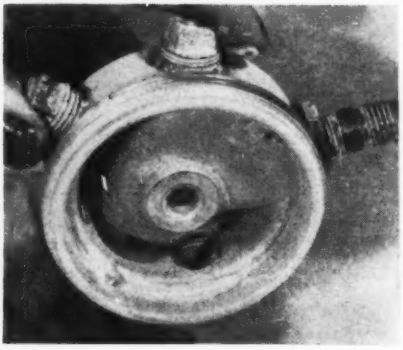
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only made a good start in realizing on all of the potential advantageous uses of Dy-Chek in the large pump plant. The same applies equally to the adjacent big Oil Well Division plant which makes Byron Jackson one of the nation's leading producers of petroleum drilling and production equipment.

Both Dy-Chek solutions and the parts to be tested should be at room temperature (70°) at least, as the liquids

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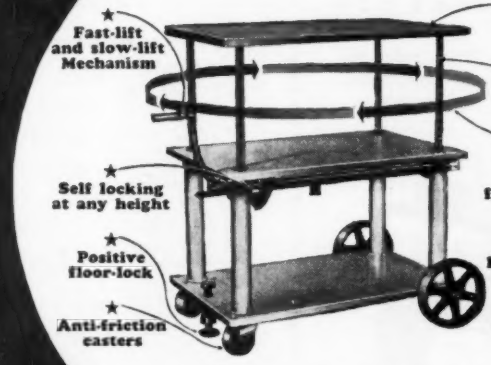
6. This oxygen regulator part would not maintain constant pressure for oxygen supply in gas welding. Visual inspection revealed no flaws. Dy-Chek showed these cracks on each side of the threads for consequent oxygen leakage.



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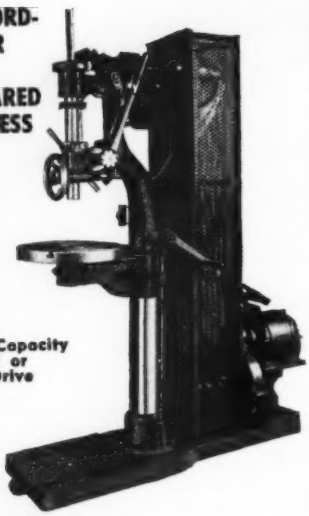
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thicken with cold. If a part is cold to the touch, it should be warmed, and if too hot for comfort, the temperature is too high, though for maximum sensitivity to minute flaws the part should be at between 100° and 150°F. The Dy-Chek Developer contains white solids suspended in quick drying liquid so that for good indications of penetrant from separations, it should be kept thoroughly mixed when in use by an occasional shaking of the container.

For large scale use of Dy-Chek testing, parts can be cleaned in a vapor degreaser, with special attention paid to cleaning all holes, threads, and reentrant angles, even acid etching or vapor blasting if indicated on special units. Sand blasting is inadvisable as it may close up small openings. For very small flaws such as grinding checks, the Penetrant should be applied three times with the allowance of five minutes penetration time after each application. The Penetrant and Developer liquids can also be applied by spraying or dipping, of either is found to be more efficient than brushing. The End.



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MACHINE and TOOL
BLUE BOOK

REPORT NUMBER 10

Chucking Machines, Turret Lathes, Hand Screw Machines.... Part 2

This is the tenth in a monthly series of special reports discussing various types of machine tools. Included in this month's report on Chucking Machines, Turret Lathe and Hand Screw Machines, Part 2 are:

1. high velocity carbide turning.
2. descriptions of late model chucking machines, turret lathes, and hand screw machines
3. specifications of American-built machines

The eight previously published reports discussed: 1. Thread Rolling; 2. Power Press Brakes; 3, 4, 5, Milling Machines; 6. Honing, Lapping, Superfinishing; 7. Automatic Screw Machines; 8. MAPI Replacement Formula; 9. Chucking Machines, Turret Lathes, Hand Screw Machines, Part 1.

Part 1. High Velocity Carbide Turning

by **Leif Fersing,** Experimental Engineer
Jones & Lamson Machine Co

The term "Carbide High Velocity Turning" has lately come into use to indicate higher turning speeds than have heretofore been considered economical or practical for machining steel. Turning speeds of 350 to 400 FPM were generally considered high, whereas today turning speeds for steel from 400 to 1400 FPM are actually used in production with great success. Most tool load data in this article are obtained from turning cuts on 3½" diameter solid bars and on two types of normalized steel, SAE-C1118, cold rolled, and SAE-8747, hot rolled. The cuts were taken on a J & L No. 5 Ram Type Turret Lathe provided with a 15 h.p. motor. Spindle speeds, 123, 253, 365, 510, 734, 1041 and 1500 rpm and feeds .007, .011, .015 and .022 I.P.R. were used for a representative range of cuts with carbide tools. These steels were chosen as their machinability is fairly representative of steels used in manufacture today. All turning cuts were taken with tools having the cutting edge perpendicular to the axis of the work and a .015" nose radius, when not otherwise stated.

Note: The dividing line between chucking machines and other machine tools on which work is chucked is sometimes so fine that it is difficult to draw a sharp line. Thus, in the case of stub lathes and some automatic lathes, which might be classed in the chucking machine category, the editors have decided to classify them under Lathes, chucking, and will present them in future issues in the special report devoted to Lathes.

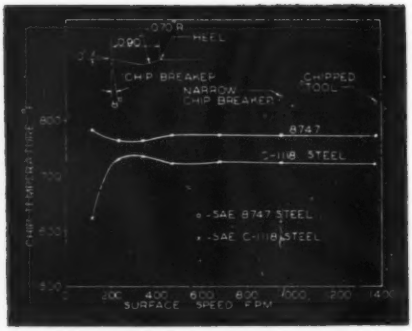


Fig. 1. Average Temperature of Chips versus Cutting Speeds for C-1118 Steel and 8747 Steel. .015" Feed P.R. .150" Depth of Cut.

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Average Temperature of Chips

An interesting phenomenon when cutting steel without coolant is the change in color of a chip as cutting speed is varied. For example, when machining C-1118 steel at 2400 fpm using .015" feed and a tool having 10° positive side rake angle, the chip discolors only slightly to a light straw color. As the cutting speed is reduced to below 1000 fpm, the chip starts to darken, turning purple blue between 200 and 300 fpm, whereafter the chip again becomes lighter, showing only a slight discoloration at 100 fpm. A similar, though much less pronounced condition exists when 8747 steel is machined under the same conditions. The mean temperature of this chip is higher and rapid oxidation takes place producing a purple blue color as the chip is left in the air to cool.

The calorimeter method was used for determining the average temperatures of chips at various cutting speeds. Some results of such tests are shown in figure 1. The average temperature of the chips as cutting speed is increased above 450 fpm remains approximately constant. The above mentioned variation in color of the chips at high cutting speeds is probably due to variations in the thickness of chips and in the rate of air cooling at different speeds. A chip breaker, figure 1, was used.

Chip breakers and rake angles on tools have a great influence on the average temperature of a chip. The average temperatures of the chips from 8747 steel followed approximately the curve shown in figure 1, whereas for C-1118 steel the average temperature of the chips increased very rapidly when cutting speed was reduced to below 250° fpm reaching a temperature of about 780° at 112.5 fpm. This chip breaker was definitely of a poor design for C-1118 steel at low cutting speeds as evidenced by the shapes of the chips and their purple blue color.

When cutting conditions were alike, the cross section of a chip from 8747 steel was always smaller both in width and thickness than of a chip from C-1118 steel. A chip is more or less trapezoidal in cross section and always thicker than the feed and wider than the depth of cut although this effect is reduced as speed is increased. Furthermore, the average temperature of a chip taken at a certain speed and feed increases when a tool breaks the chips into smaller parts and/or forms a heavier cross section.

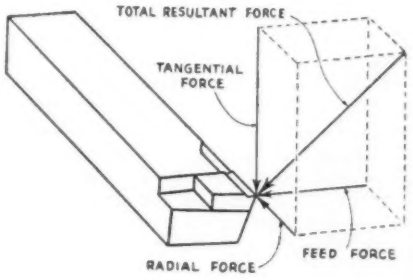
Measurements of Tool Loads

SR-4 Bonded Wire Strain Gages were used to measure deflections in a specially designed tool holder. Three components of the load as shown in figure 2 were recorded simultaneously with the help of Direct Inking Oscillographs.

Figures 3 and 4 show the loads on a

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Fig. 2. Components of Tool Load.



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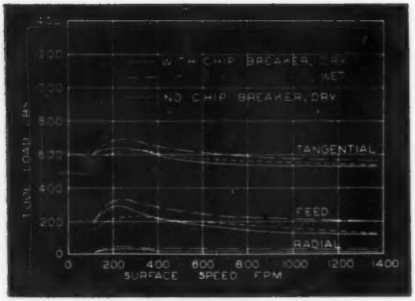


Fig. 3. Affect of Coolant and Chip Breaker on Tool Loads. C-1118 Steel 10° Side Rake Angle, Chip Breaker as in Fig. 3 .015" Feed P.R. .150" Depth of Cut.

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tool with the same chip breaker and for the same feed and depth of cut as used in figure 1 for C-1118 and 8747 steels respectively. The load curves are similar to the average heat curves. Above a certain speed, about 450 fpm, the temperature of the chips remained approximately constant, whereas tool loads, especially for C-1118 steel, continued to drop.

The effect of coolant (50 parts water to 1 part wetting agent) on tool loads is plotted in dot and dash lines. All tool loads increased when coolant was used. It is obvious from these curves that the coolant had no lubricating value, but that a tempering of the chips tool place. The cooling effect was excellent as all chips remained silver white. The chips became more broken and slightly smaller in cross section than when turning dry. In order to complete the picture, loads on a tool with 10° side rake, no chip breaker and without coolant are plotted in dotted lines. Note that at certain speeds for C-1118 steel the loads on the tool without chip breaker are greater than on the tool with chip breaker. The reason for this phenomena may be that at higher speeds the chip did not follow the contour of the chip breaker. The contact between the chip and the tool was along the cutting edge and against the heel of the chip breaer. This condition existed for all cuts on 8747 steel.

In figure 5 rate at which heat is generated by the tangential load at the tool point and rate of heat generated in the chip are plotted against cutting speed. The tangential work equivalents in B.T.U.'s are obtained from the tangential loads (cutting dry with chip breaker) in figures 3 and 4 and the "heat into chips" from the temperature rise of chips, used for plotting curves in figure 1. Two other curves are shown and represented as "percent" of heat into chips. They are obtained by dividing "heat into chips" by "tangential work equivalent".

Tangential work equivalent = Power /778 in B.T.U. per minutes.

Heat into chips = (T — t) CW in B.T.U. per minutes

Wherein T—t = Temperature rise of chips in F°

C = Average specific heat of chips

W = Weight of chips in lbs per minute

Power = Tangential load x feet per minute

Friction between the tool and the chip, deformation of the chip by the chip breaker, and heat going into the work piece and the tool are variable factors accounting for the difference in the "percentage" curves. In this connection it may be pointed out that the difference in machinability of the two steels was quite noticeable during test



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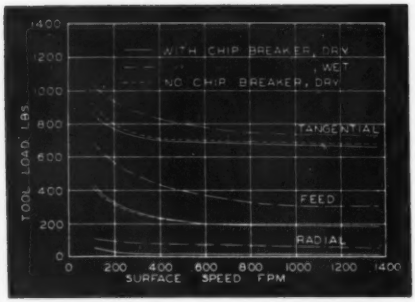


Fig. 4. Affect of Coolant and Chip Breaker on Tool Loads. 8747 Steel 10° Side Rake Angle, Chip Breaker as in Fig. 3 .015" Feed P. R. .150" Depth of Cut.

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cuts. The C-1118 steel was very free machining and the limitation on speed and feed for the desire of depth of cut was the capacity of the motor (30 HP at 100% overload). The test cuts were, however, short, ranging from ½" to 1". When machining 8747 steel, especially with positive rakes, difficulties in tool life started at about 700 fpm cutting speed. Only by paying constant and careful attention to the lapped finish on the cutting edge of a tool was it possible to obtain the stable condition necessary for solid comparison. 5° negative rake angles gave no difficulties in this respect even though tool loads were higher than for positive rakes.

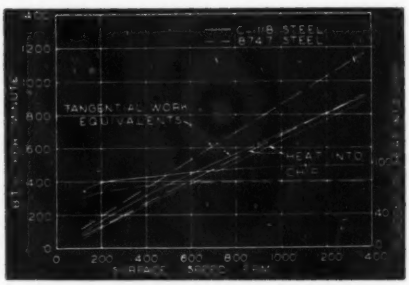
The tangential work equivalent and the tool load are two of the factors controlling the speed at which steels can be turned with carbide. A combination of the effects of pressure, speed, temperature, rate of chip flow, co-efficient of friction and/or surface roughness on a tool, tool angles, duration of cut, and rate of cooling, together determine a critical speed above which heat becomes excessive causing pitting of the carbide and rapid breakdown of the cutting edge. The "percentage" curves are of particular interest in that they show a great difference between the two steels. C-1118 steel, which is freer machining, produces the heaviest chip; that is, more deformation is done at the tool point than for 8747 steel. Disregarding extreme conditions, the thickness of a chip generally indicates the machinability of a steel, the heavier the chip, the more free machining the steel and the higher the percentage of heat carried away by the chip.

In figure 6 the effect of nose radius, relief angles and width of chip breaker on load components are shown. The feed load is composed of four components; penetration load forcing the tool point into the parent metal, friction load from the chip flowing over the tool surface, crowding by a chip breaker where a breaker is used and a component of the tangential load depending on the side rake angle, increasing the feed load for negative rakes and decreasing it for positive rakes and zero for zero rake angle. As the nose radius is increased, the feed load remains almost constant whereas the radial load increases. Even with a pointed tool, the chip widens and flows away from the work, thus producing a frictional component in a radial direction. The effect of the variation in relief angles is not noticeable as long as the tool is sharp, but becomes very prominent especially for small relief angles when the tool starts to wear. The penetration load of a cutting edge is very small as long as the tool is sharp and the frontal penetrating area at a minimum.

The feed load shown by the curve is the friction force between the tool and the chip as the rake angle is 0°.

• • •

Fig. 5. Cutting Heat Versus Speed. Chip Breaker Fig. 3. .015" Feed P. R. .150" Depth of Cut.



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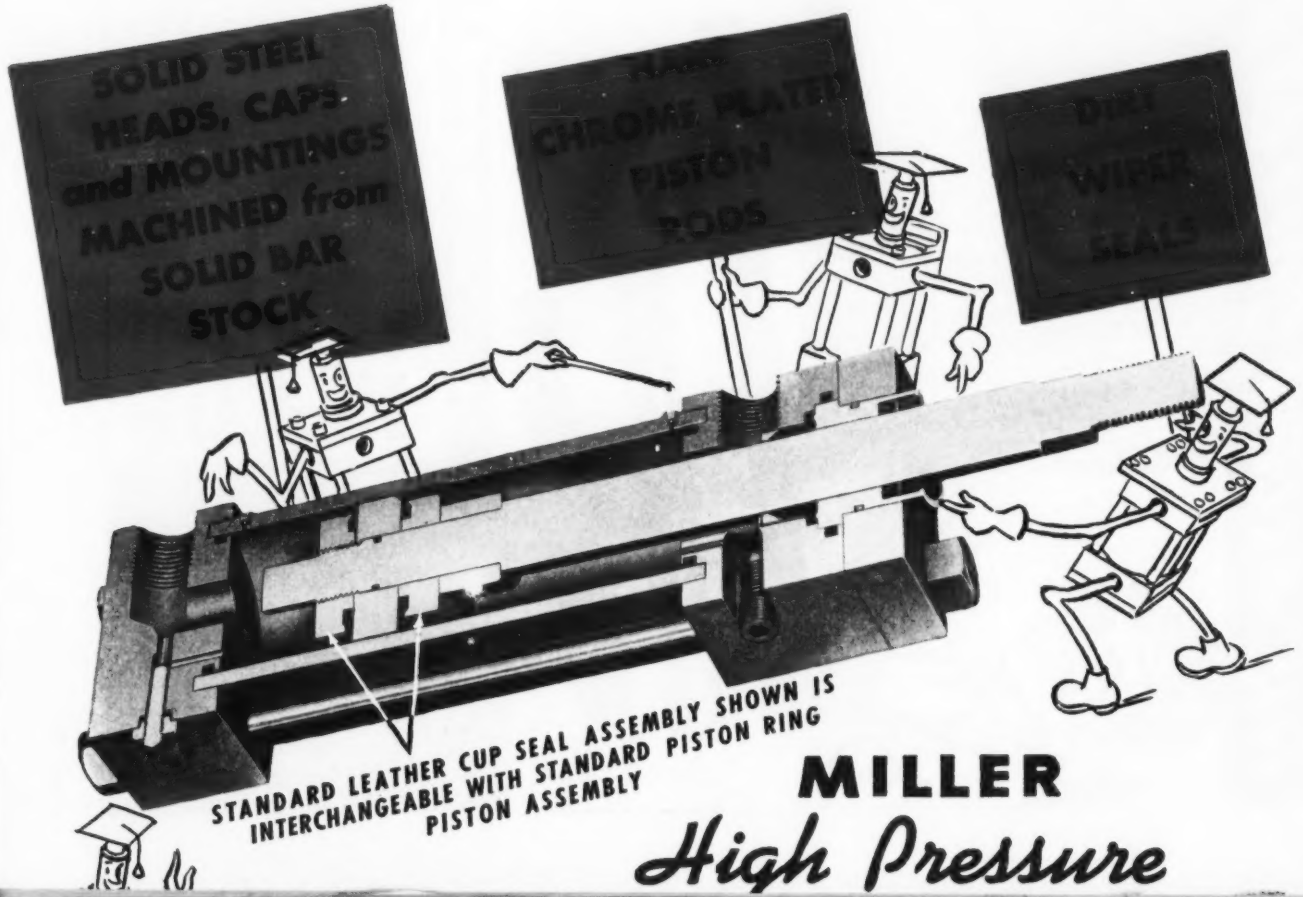
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Years before the Joint Industry Conference (J. I. C.) Standards for specifying "quality" hydraulic equipment were adopted, the *standard* design and construction features of Miller High Pressure Hydraulic (2000-3500 psi) Cylinders already included ALL the specifications for cylinders, seals and pistons now called for by the "Standards". Hard chrome plated, scratch-resistant piston rods and dirt wipers have long been standard Miller cylinder features yet are required by the "Standards" only under severe conditions.

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Write for illustrated cylinder bulletins A-105 and H-104

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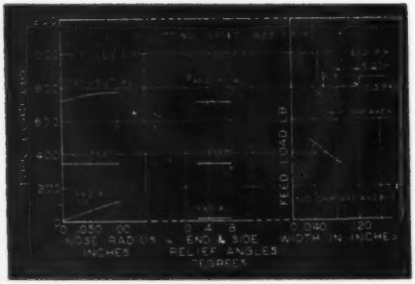


Fig. 6. Affect of Nose Radius, Side Relief and End Relief Angles and Width of Chip Breaker on Tool Loads. C-1118 Steel .150" Depth of Cut, 425 F.P.M. Cutting Speed, 0° Side Rake Angle 3.2" Outside Diameter of Work.

• • •

The importance of carefully designed chip breakers is emphasized by the marked effect of breaker dimensions on feed loads as shown at the right in figure 6. All combinations of width and depth broke the chip.

Surface Deformation

Cutting speed also affects the amount of deformation at and below the finished surface of a turned piece. Although the greatest deformation only penetrates .001" to .002" below the surface, it is clearly demonstrated that the cutting speed influences the surface structure. Deformation decreases with increased speed, this being less pronounced in the high velocity range, is less without coolant than with coolant, and is less for steel with higher tensile strength.

Production Applications

Test results and experimental work give the engineer a good base to work from for planning future developments and improvements. In machining, the variables are many and results often contradicting because components of many factors are hard to control and difficult to evaluate. The ultimate value of pioneering work is therefore determined on the production line rather than in the laboratory. Although cutting without coolant has shown certain advantages in the laboratory, these are generally far outweighed by disadvantages appearing on the production line such as heat expansions, preventing holding close dimensions, tool life, handling of hot workpieces and chips, etc. There are occasions, however, when cutting dry is the most practical solution; for example, when intermittent cuts are taken at high cutting speeds where the repeated quenching of a carbide tip by coolant quickly shatters a cutting edge.

Cutting speeds in the high velocity range have already proved themselves on the production line. An amazing example is the turning of automotive drive pinion forgings with the tooling shown in figure 7, on a 16" Fay Automatic Lathe shown in figure 29A. The forging (SAE 8620 Steel Bhn 176) is driven by a chisel drive and completely machined in 8.5 seconds as follows:

Spindle Speed	1200 RPM
Cutting Speed (Max.)	1185 FPM
Turning Feed	.0148 I.P.R.
Facing Feed	.012 I.P.R.
Cutting Time	8.5 Seconds
Floor to Floor Time	17 Seconds
Maximum Stock Removed	3/8"—Total 2 lbs. (Approx.)
Maximum Horsepower	66



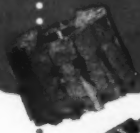
"Quick, boss, change your clothes. There's a machinist outside who looks like he's going to ask for a raise."

INGERSOLL



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New ideas in the design of milling and boring cutters frequently play an important role in the success of specially designed machine tools such as Ingersoll builds. These cutters are added to our line of inserted blade milling and boring tools, already the most extensive offered by any manufacturer. We are in a good position to furnish you cutters suited to your work.

Ingersoll's new close-bladed boring cutters, illustrated here, were designed to meet requirements in automotive cylinder block work. Closer spacing of the blades, made possible by a new principle of design, permits the use of higher feed rates, or the attainment of greatly increased tool life at normal feeds.



Upon request, we will be glad to furnish feed rate and tool life data based on actual production experience with these or any other Ingersoll cutters. Write for Catalog 56 describing Ingersoll's full line of milling and boring cutters.

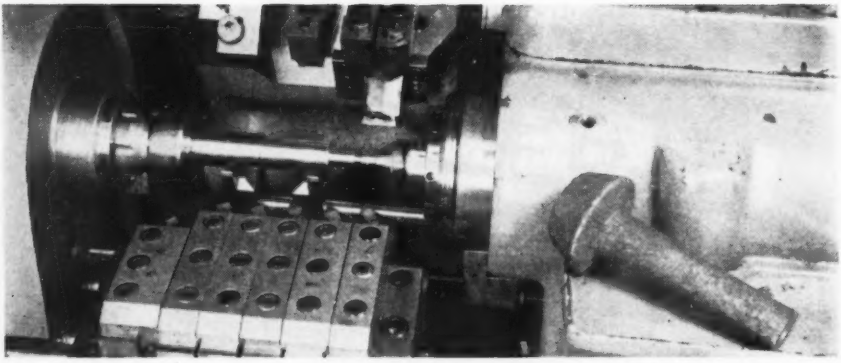


Fig. 7. Tooling for Automotive Drive Pinion Forging on a 16" Fay Automatic Lathe.

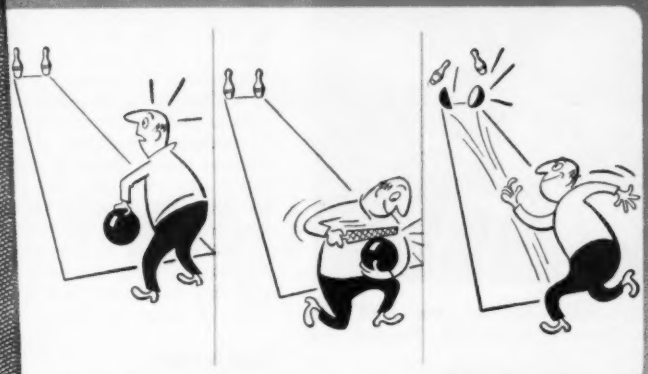
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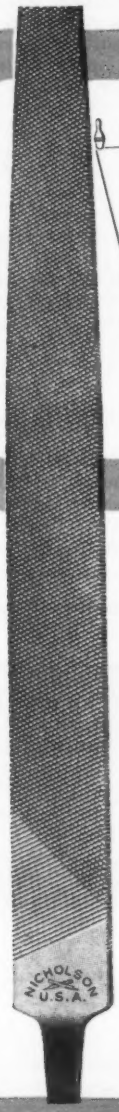
Improvements in tool life after a year's production are still being made and some remarkable results are worth mentioning. As many as 660 pieces per index have been obtained on the square insert turning the large tapered diameter of the pinion and over 1000 pieces per index on several of the triangular inserts. Note that all tools are of the carbide insert type, requiring a minimum time for tool changes and that tool holders are built as heavy as space permits. The coolant is supplied through holes integral with the tool holders and thus always forcibly directed at the cutting edges of a tool. To gain full advantage of cutting speeds in the high velocity range other refinements than maximum rigidity and quick tool change become vital engineering problems. The loading time in this setup is reduced to a minimum in the following way: The operator puts the forging which has been faced to correct length and centered in both ends on the two brackets shown underneath the finished piece and pushes a button which starts the entire automatic cycle. The ram, with a live center, moves forward, catching the forging on centers, forcing the knife edges into the face of the forging by hydraulic pressure, to provide the drive, the splash guard closes and the spindle starts. When the piece is finished machined, the spindle stops, the hood opens, the ram withdraws and the finished piece drops down on the two brackets to be replaced with a new forging by the operator. Stopping and starting the spindle without appreciable loss of time is in itself a problem. The spindle comes to full speed in less than 1½ seconds, and at maximum production 3½ times a minute. The Kinetic Energy of rotating parts is about 10,000 ft. lbs. per start or 35,000 ft. lbs. per minute, which has to be dissipated as heat between the clutch and brake surfaces of reasonable size without excessive wear. 100,000 stops and starts is considered a short life.

The importance of tool point surface finish is emphasized in another example from the production line shown in figure 8 with machining operations, feeds and speeds shown in figure 9. The cutting of the 1¼" long thread at B is made with carbide chasers in about 1/3 of a second cutting time. It used to be necessary to resharpen the chasers after every 250 pieces, but the chasers are now provided with superfinished cutting surfaces and 700 pieces are made without resharpening. The material in the bolt is SAE 1040 steel.

A steel considered difficult to machine is SAE 52100, commonly used in anti-friction bearings. This steel has a machinability rating, using the drill

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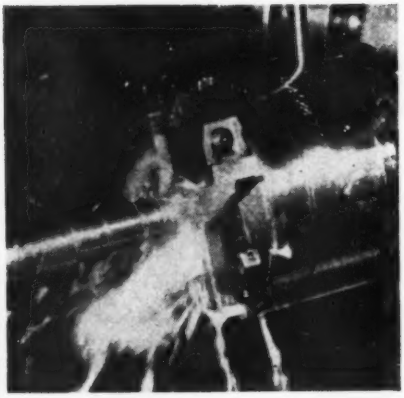


Fig. 8. Threading Bolt at 2000 RPM with Carbide Chasers in a J&L Tangent Die Head.

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method of penetration, of about 40% lower than 8747 steel. The tooling for boring and facing an outer race is shown in figure 10. The ring forging is approximately 12" in diameter and 11¼" long with 3/16" of stock coming off on the side. The race is finished machined with only one cut taken on each surface in two operations, at cutting speeds of 594 fpm at .015" feed P.R. for boring and 655 fpm at .020" feed P.R. for turning the outside diameter in 3.35 and 2.76 minutes cutting time respectively, and with a tool life of 17 to 20 pieces for boring with a shank tool and 25 to 30 pieces per index for turning with a round insert. Tool setting gages permit replacing of shank tools in about 1½ minutes a piece. Therefore, any gain in tool life from reduced speeds would have to be considerable to increase production.

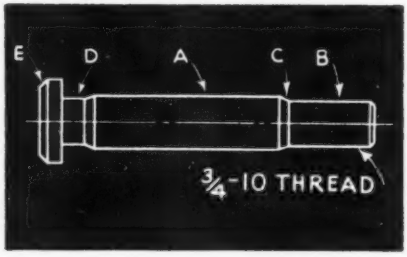
In figure 11 is shown a ball bearing outer race, also of 52100 steel, and which for several years has been machined at Jones & Lamson Machine Company in three operations to demonstrate possibilities in carbide high velocity turning. The ball groove .161" deep is machined in the third operation by a form tool at 945 fpm cutting speed and .006" feed in 2½ seconds cutting time, using about 50 HP. The average number of pieces per tool grind is about 220. The groove has been machined in only 1½ seconds by increasing feed and without appreciable reduction in tool life. The gain in floor to floor time was, however, so small from 15 to 14 seconds that no gain was made in a day's production on account of a few extra changes of tools. To increase production it would be necessary to reduce chucking time rather than cutting time. Similar grooving operations are run on the production line by bearing manufacturers at cutting speeds between 500 and 600 fpm. Of futher interest is that the grooving operation is run successfully both wet and dry since the tool is in the cut too short a time to become overheated.

Conclusions

Both production experience and experimental tests have shown that higher cutting speeds for machining steels have many advantages such as lower tool loads and less surface deformation on finished parts; and that tool life can

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Fig. 9. Operation Data for Machining Bolt shown in Fig. 30.



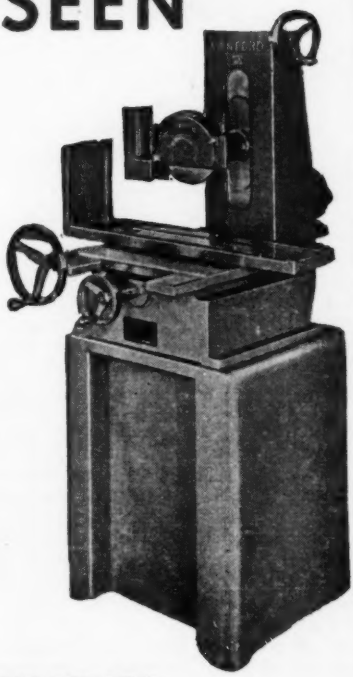
TURRET POSITION / MEMBER	CROSS SLIDE	OPERATION	SPINDLE RPM	SURFACE SPEED	FEED
1		STOCK STOP			
2		POINT	2000	714	HAND
3		TURN A	2000	714	.015"
4		TURN B	2000	422	.015"
5		THREAD B	2000	390	.100"
	REAR	FORM C, D & E	2000	714	HAND
	FRONT	CUT OFF	2000	714	.0035"

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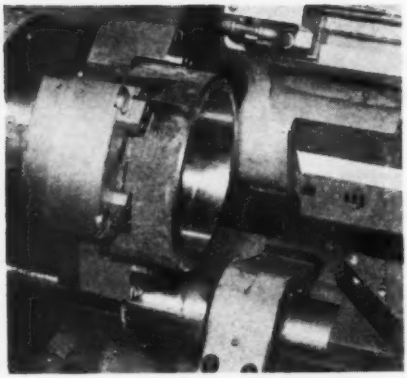


Fig. 10. Boring and Facing of Bearing Forging showing Splash Guard withdrawn.

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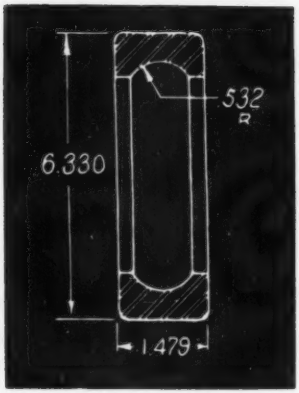


Fig. 11. Outer Bearing Race.

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be very economical even though the rate at which heat is generated at a tool point is practically proportional to cutting speed. Improvements in the quality of tools, coolants, machine construction materials, methods and controls have resulted in high permissible cutting speeds with increased production and possibilities for greater economical benefits. It is not suggested that cutting speeds should or can be doubled or tripled on present equipment without careful attention to all factors involved nor that the limit in production capacity has been reached in examples from the production line. The various tests show that there are no drastic changes in tool loads and chip temperatures as cutting speeds are increased from 300 to about 1400 fpm, that tool finish and angles have a vital affect on tool life and that chip breakers and cutting angles on tools should be modified to suit both cutting speed and type of steel for obtaining highest efficiency in chip removal. A few years ago when carbide was introduced, most machine tools lacked power, speed and rigidity for efficient use of carbide tools. The recent successes in the "high velocity range" indicate that a similar era is approaching when a large proportion of existing machine tools is rapidly becoming obsolete.

The author wishes to express his appreciation to Lester Sheehan, Chief Metallurgist, Harold L. Murch, Chief Optical Engineer, David N. Smith, Research Engineer and William Moeser, Research Engineer, all of the Jones & Lamson Machine Company, for their collaboration in the preparation and presentation of the data included in this paper. THE END.

This paper was prepared by Leif Fersing, Experimental Engineer, Jones & Lamson Machine Co., Springfield, Vt., and delivered at the 71st Annual Meeting of the ASME in New York on November 27, 1950. The editors thank the ASME for their kind permission to make this material available to MACHINE and TOOL BLUE BOOK readers.

Part 2. Descriptions of Late Model Chucking Machines, Turret Lathes, and Hand Screw Machines

Cut Master Vertical Turret Lathe

The 54" Cut Master here illustrated and made by the Bullard Co., Bridgeport, Conn., is one of 6 sizes manufactured. The 30" and 36" machines are available with swiveling main turret head and side head, while the 42", 54", 64" and 74" machines are available with any combination of a total of

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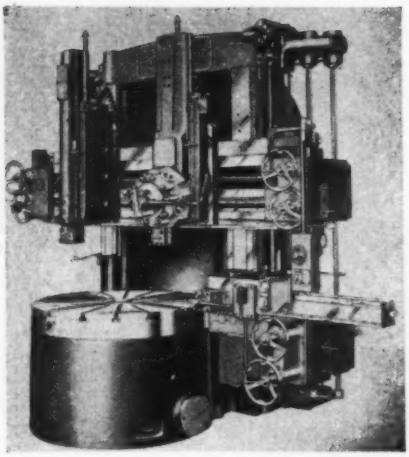
If you haven't yet had the opportunity to investigate this remarkable lapping development, it will pay you to send for our 16-page booklet which describes the entire range of machine sizes with lap plates from 12" to 72".

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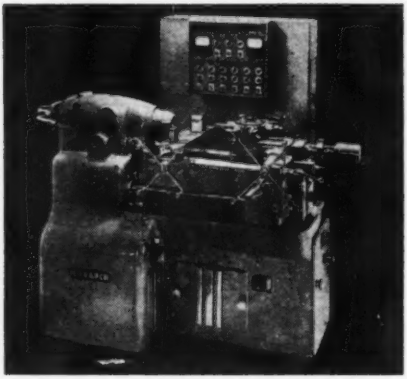


three heads; namely, the swiveling main turret head, the swiveling left hand ram head, and the non-swiveling side head.

The Cut Master table carrier consists of taper roller bearing in combination with a roller thrust bearing both of which are large. These are arranged and mounted so that the initial preload permanently affects both bearings. This combination of radial taper roller and roller thrust bearings provides rigidity and maximum support of the table under either or both vertical and horizontal heavy cutting especially with work at a maximum height from the table.

Monarch's Speedi-Matic

The Speedi-Matic, built by The Monarch Machine Tool Co., Sidney, O., features a preselected automatic electronic speed and feed change. This provides up to nine different speeds and six different feeds for each job. Feed and speed indicators enable operator to select quickly the correct speed and

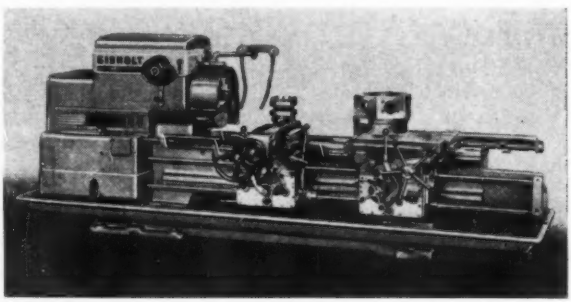


feed for each turret position and the correct speed for each crossfeed slide position.

Important feature is the gearless, stepless, all electronic drive. It provides an infinitely variable range, both forward and reverse, with a top speeed of 4,000 r.p.m. The power feed ram type turret permits the correct feed to be repeated for every piece in the lot.

Gisholt 2L Turret Lathe

In this machine, made by Gisholt Machine Co., Madison, Wis., hydraulic power, controlled by a single lever is used for starting, stopping, and reversing the spindle. Hydraulic power engages and dis-engages the forward and reverse multiple disc clutches; and when the forward-reverse control lever is in neutral the pressure is directed to the con-



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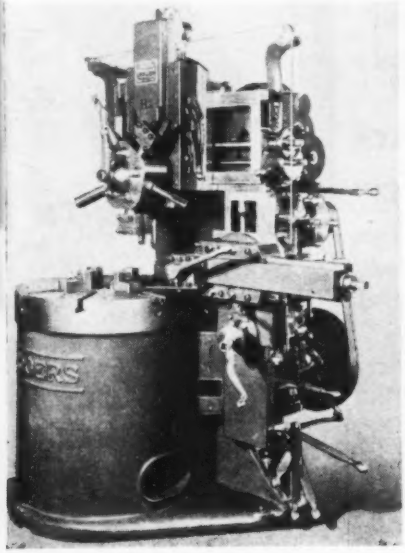
tracting band-type brake located directly on the spindle.

The machine features a hydraulic speed selector with which all spindle speed changes are accomplished without stopping the spindle. This hydraulic power is controlled from the hand wheel.

For ease of operation comparable to the headstock control, power rapid traverse is provided for movement of the cross slide in and out and along the bed in either direction, also for movement of the hexagon turret carriage along the bed in either direction. The rapid traverse shaft is driven by its own motor independently of the main drive. Easy control of even heavily loaded turrets is by conveniently located traverse levers. Feeds are automatically disengaged when traverses are thrown in.

Rogers Vertical Turret Lathe

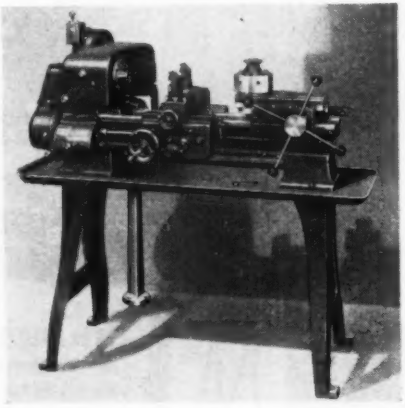
This vertical turret lathe, made by Rogers Machine Works, Inc., Alfred, N.Y., has an adjustable five-position main vertical turret which provides tool settings for boring, drilling, reaming, turning and thread cutting. A swivel side head is designed to permit setting at any angle up to 35° each side of horizontal as well as being adjustable up and down and left to right. Square turret indexes to eight positions.



All machining operations are on a level chuck to allow the work to slide easily into exact position. Face of chuck is circularly scribed one inch apart to locate set-ups quickly for production runs.

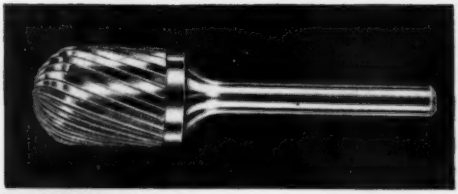
Logan No. 850-2 Turret Lathe

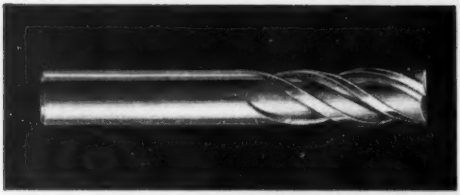
Features of this lathe, built by Logan Eng. Co., 4901 W. Lawrence Ave., Chicago, Ill., include precision ground bed, precision prelcaded ball bearing spindle mounting, adjustable gibs to compensate for wear of turret and cross slide. The hexagonal design of the turret permits mounting of tools on face of block as well as in standard bored tool hole. Turret holes are bored from the headstock. Pilot wheel operation of the turret permits easy, positive control action of cutting tools.

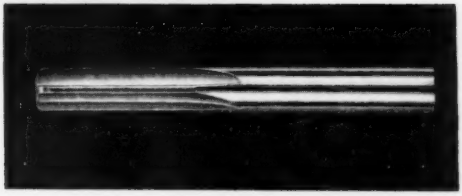


Countershaft assembly is carried on a three point suspension and is completely insulated by rubber at all points.

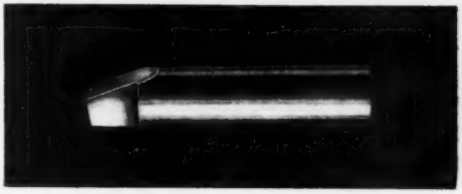
Grease-sealed preloaded precision bearings in the spindle mounting require no adjustment or lubrication.







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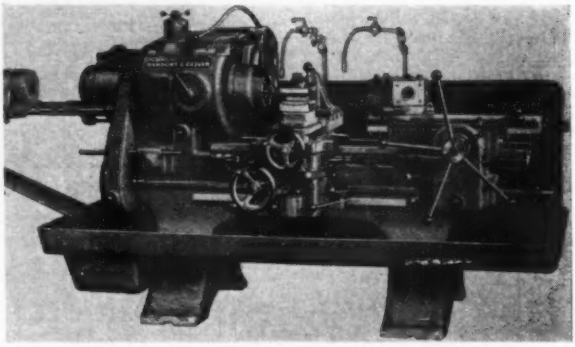


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Bardons & Oliver No. 7



This model, made by Bardons & Oliver, Inc., Cleveland, O., features hydraulic power which shifts the gears in the head and applies the spindle brake. An automatic speed calculator forms an integral part of the pre-selector. The dial drum can be preset to either spindle speed in r.p.m. or cutting speed in f.p.m.

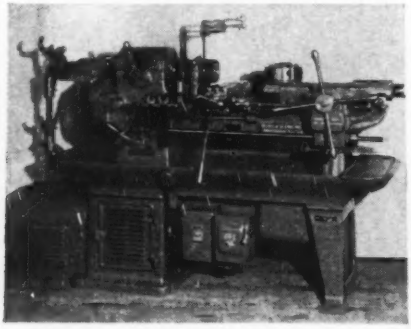
The design of the head provides shorter span between bearings resulting in greatly increased strength and rigidity of spindle and drive shafts.

The universal cross slide carriage has nine selective, power reversible cross and longitudinal feeds. The turret slide and the saddle both have hardened and ground alloys steel wear plates for long lived accuracy. The turret is automatically unclamped and indexed by the backward movement and locked and clamped by the forward movement of the slide.

Brown & Sharpe No. 2 Wire Feed Screw Machine

This No. 2 hand screw machine, made by Brown & Sharpe Mfg. Co., Providence, R. I., features one single lever for control of spindle movement, high, low speed and stop. A large brake shoe quickly stops spindle rotation. The design of the braking mechanism is such that the brake cannot be applied except when the spindle clutch is in neutral position.

Forward movement of the turret slide is steady and powerful. Return movement of the slide automatically indexes the turret to a new tool position by a vertical tapered pin located at front of turret slide.



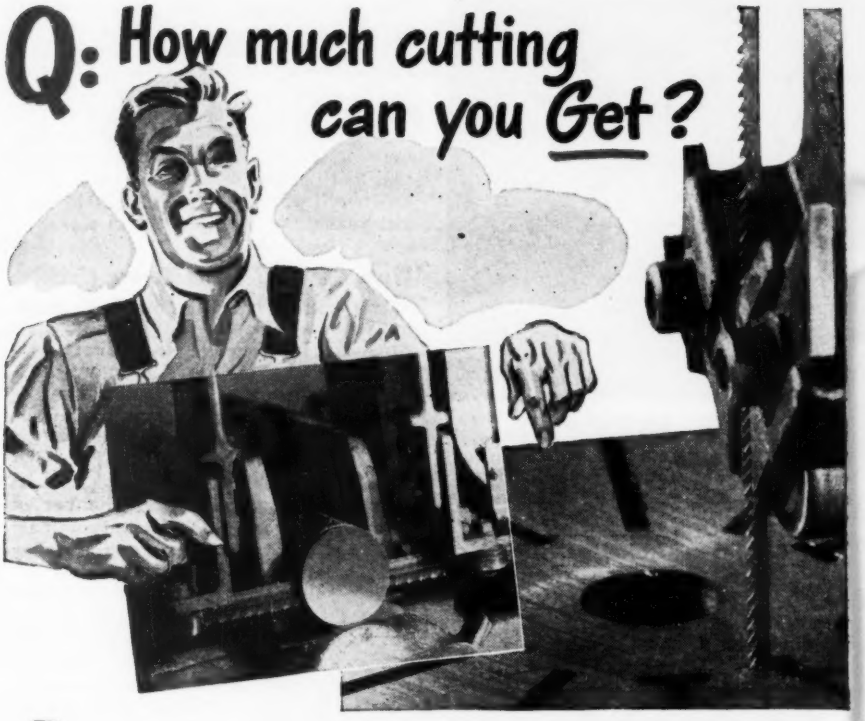
The cross slide is provided with a fast-action lever feed for regular work and a ball-crank feed for the heavier work or more precise forming cuts. The cross slide bed also is provided with hand longitudinal feed (rack and pinion) to facilitate the longitudinal positioning of the cross slide and provide a means of performing turning, recessing and under-cutting operations not readily accomplished with turret tools.

Rivett Cabinet Turret Lathe No. 918S

This model, made by Rivett Lathe & Grinder, Inc., Brighton, Mass., is built for stationary collets ⅞" capacity or draw-in collets of 1⅛" capacity and step chucks of 6" capacity. An automatic lever chuck closer quickly actuates stationary or draw-in collets and step chuck.

The double cross slide, as furnished with the turret lathe assembly, provides tool mounting and feed for two turning operations. The cross slide is dovetailed and gibbed to the base and is traversed by hand lever through rack and pinion.

Q: How much cutting can you Get?



A: Get SIMONDS Metal-Cutting Band-Saws... and find out!

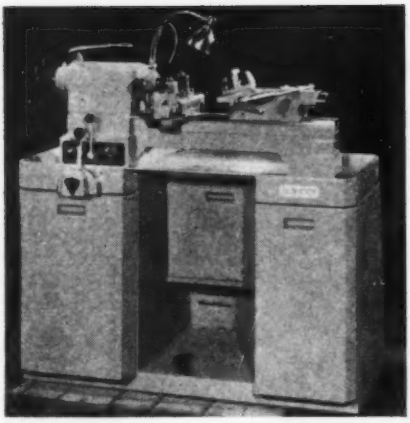
No matter what kind of tough cutting job you're up against, you can't beat these bands for long, trouble-free service. Uniform tooth-set and temper assure fast, smooth cutting. And longest saw-life is assured by special heat-treatment of the back of the saw in order to prevent stretch, weaving in the cut, and cracking of gullets.

Simonds Metal-Cutting Band Saws are furnished with *Standard Tooth* (regular or wavy set) . . . and *Skip Tooth* for cutting plastics, wood, aluminum, and other soft materials. All widths are now packed in handy 100′ containers, and in coils of 300′ . . . or welded to exact machine-length. Get delivery from stock from your local Simonds Distributor . . . call him today.



Branch Offices in Boston, Chicago, Los Angeles, San Francisco and Portland, Ore. Canadian Factory in Montreal, Que.

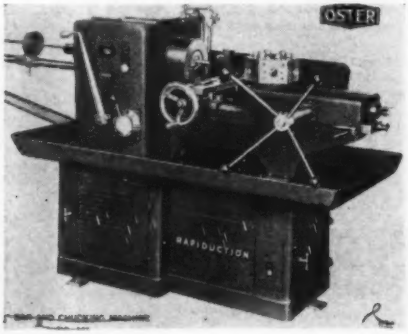
SIMONDS
SAW AND STEEL CO.



Universal turning slide mounts at either front or rear of a double tool cross slide in place of standard tool slide and may be used in combination with any other cross slide tooling, or two units may be used, one at front and one at rear. An automatic indexing turret is precision-made. The turret head. tilted to swing die heads, roller box turning tools, etc., has six ¾" dia. holes.

Oster Rapiduction Turret Lathe

The No. 601, made by The Oster Mfg. Co., Cleveland, O., has a 4-speed motor permitting four spindle speed changes without change of sheaves. (2 speed motor is obtainable as optional equipment.) Electrical controls have speed selector, giving finger tip control, and placed conveniently for the operator.

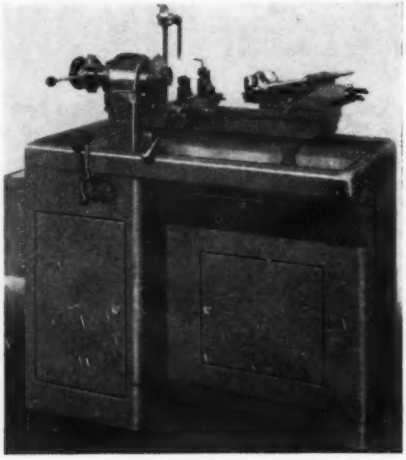


The turret is automatically indixed by movement of the carriage and the saddle stops are synchronized with the revolution of the turret. Each turret face has six tapped holes for mounting various types and sizes of fixtures and tool holders. The main turret holes are bored all the way through to permit passage of long lengths of stock.

Wade Model 7 Hand Screw Machine

The spindle of this molel 7, made by The Wade Tool Co., Waltham, Mass., runs in precision anti-friction preloaded bearings. An SKF heavy-duty, high speed, double-row roller bearing is mounted as close as possible to the spindle nose in order to supply the most solid support radially. This spindle is a special machine tool spindle bearing having the proper number of cylindrical, staggerel rollers to impart high radial capacity, extreme rigidity and smoothnesss of operation.

Turret locating pin is situated underneath the turret, and locates at the turret front for maximum accuracy. The turret head is automatically clamped and unclamped, as well as automatically indexed, by one complete movement of the slide lever.



TO GET MORE OF YOUR MONEY'S

Production Pointers from GISHOLT

GISHOLT COST CUTTING IDEAS

Gisholt—A Unique Service in the Machine Tool Industry
Here you obtain unbiased help on your turning problems, because Gisholt's broader range of equipment includes both manually operated turret lathes and automatic lathes. Gisholt's recommendations are made without prejudice for one type of machine over another.

BEARING CAPS... CHEAPER BY THE HALF-DOZEN SIZES

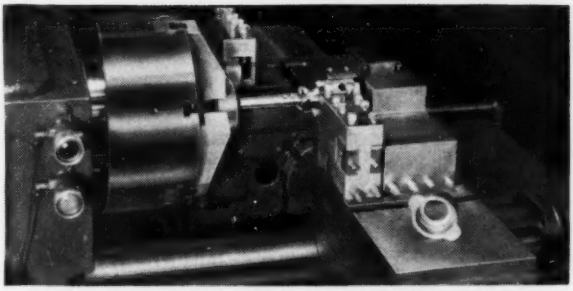
on a No. 12 Hydraulic

Smart engineers put on their thinking caps and came up with this better way of producing bearing caps in 6 different sizes, using only one No. 12 Hydraulic Automatic Lathe.

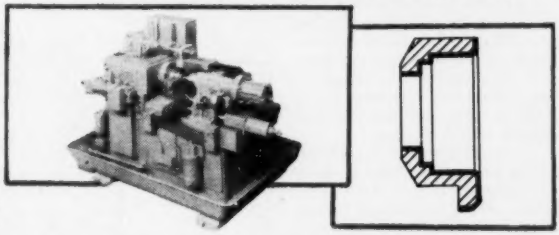
The trick was to get fast machining *and* fast changeover from one size cap to another—to keep all sizes coming fast! Here's how the job is done!

The caps are held in a 12-inch, 3 jaw air chuck with special jaws for locating. The small bore is the most critical and requires the most accurately held dimension. Rough and finish cuts are made independently of each other and without interference from other tooling. Following these, two additional counterbores are finished.

Then, the OD of the lugs is turned, and the open side of the head is faced and chamfered. Time for the entire job on the 3-inch cap is a quick 0.8 minutes! Speed on the other caps, which range up to 6 inches, is equally fast.



On this No. 12 Hydraulic the floor-to-floor time for machining 3" bearing caps is 0.8 min. The 6 caps size are shown above.



The compact Gisholt No. 12 Hydraulic Automatic Lathe, such as used on this job, features simplicity of tooling and rapid changeover.

Rapid Changeover

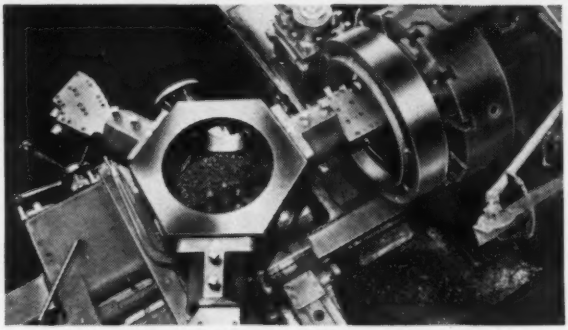
The quick, simple changeover of the No. 12 Hydraulic is an important feature for continuous high-volume production of all 6 sizes of the cast-iron bearing caps. The machine is equipped with a variable speed motor drive, providing a variation in spindle speeds of from 185 to 380 r.p.m., so that the most efficient cutting speed for each part is instantly obtained by merely setting a rheostat. No changing of drive pulleys or speed gears is needed. Well-planned tooling and accessible machine adjustment further add to the speed and ease of changeover.

GEAR PRODUCTION DOUBLED BY DOUBLING CUTS

Both Turrets of Saddle Type Turret Lathe Used to Maximum

Take the best in turret lathes . . . add a well-planned tool set-up and you're all set to topple high job-time and costs.

That's what this manufacturer did in the machining of bull gears. The job was given to a Gisholt 3L Saddle Type Turret Lathe with tooling expertly planned to take maximum advantage of both the longitudinal and cross movements of the hexagon turret. Several cuts are made simultaneously at every stage of machining.



The set-up that saved! This view shows how both turrets work simultaneously to make time on bull gear job.

Cross Feeding Hexagon Turret Pays Off

Turret face No. 1 gives two different bores and at the same time a rough turn is made from the square turret. In the 2nd turret position three different facing cuts are made simultaneously and the back facing is done by the square turret. The 3rd position provides two bores and two chamfers with the hexagon turret and a finish turn of the O.D. from the square turret.

Result of this 3L Turret Lathe job with smart tooling: floor-to-floor time cut from 28 to 12 min.



These 20" bull gears are given the rush act by a 3L Turret Lathe with expertly planned tooling.

CROSS HOLE DRILLING ON LATHE SAVES ADDED OPERATION, OPERATOR

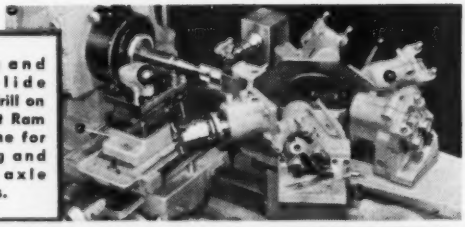
Here's Machining and "Hole-in-One"!

Here's a production pointer that pays off big in maximum parts per hour—minimum cost.

The job is machining axle shafts which require end cross holes. Instead of doing only the finishing operations on the lathe, and then moving the shafts to another station and operator for drilling, this manufacturer does the whole job at once.

A small air motor is mounted at the rear of the cross slide on the Gisholt No. 5 Ram Type Lathe. After machining is completed, the drill comes in to drill the cotter keyhole. The drill is guided by a drill jig mounted in the duplex tool holder on the turret station preceding the die head (see photo). Floor-to-floor time is only 4.3 minutes.

This little stunt pays off more than in just saving an extra operation, operator and in handling time. By doing the cross-hole drilling on the lathe, the die head which follows corrects any distortion of the surface and removes the drill-hole burr. Further inspection, hand scraping or burring is not needed.



Tooling and cross-slide mounted drill on the Gisholt Ram Type Lathe for finishing and drilling axle shafts.

HAVE YOUR "EQUIPMENT REPLACEMENT ANALYSIS" FORMS?

Here's real help in determining when and what old machine tools should be replaced. Gisholt has made up the "Equipment Replacement Analysis" form (as determined by MAPI formula) into a complete 4-page folder with step-by-step instructions. Write for your free copies today!

GISHOLT

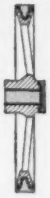
OVER-AGE MACHINE TOOLS MEAN

WORTH OUT OF MAN-HOURS

GISHOLT COST CUTTING IDEAS

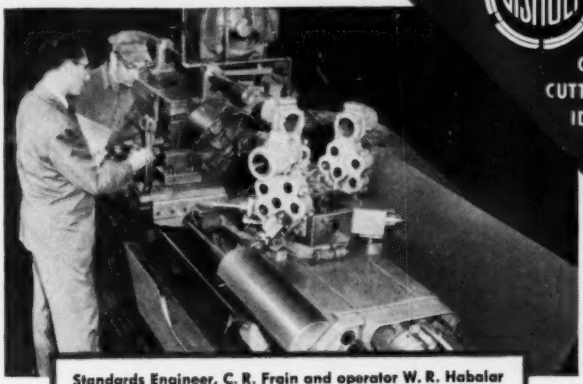
FASTERMATIC "MAKES HAY" ON HAY BALER PARTS

Saves 1500 Hours Per Year!



See this sheave? It's a small but vital part of the hay balers built by New Holland Machine Company, New Holland, Pennsylvania.

By old machining methods, 2 operations and 11.88 minutes were needed to ready the 12¾ inch sheaves for the balers. Too slow and costly, New Holland engineers figured. So they looked for a better way of doing the job—and found it: in a Gisholt 2F Fastermatic Automatic Lathe.



Standards Engineer, C. R. Frain and operator W. R. Habaler go over job. The Fastermatic upped production 63%.

Time Slashed 37%

Now, the entire job is done in *one* operation—and floor-to-floor time is cut from 11.88 minutes to only 7.5 minutes. Machining time is only 4.6 minutes. Moreover, the operator is free to handle other machines now because of the completely automatic cycle of the Fastermatic. He is needed only for loading and unloading the machine.

Figured by the year, the time saved by the Fastermatic reaches the impressive total of 1496.5 hours! Mighty important in these days of labor shortages and the need for higher production.

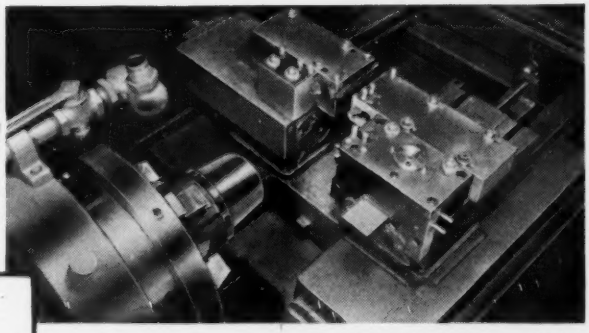
ROUGH, TOUGH STEEL CASTINGS A SNAP FOR SIMPLIMATIC

Lot of Stock Removed In Little Time

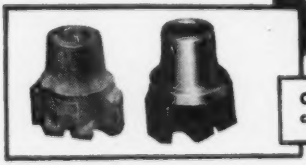
The special talents of the Simplimatic are paying handsome dividends on this job—the machining four sizes of drill bit bodies.

Being steel castings and irregularly shaped, they are not only hard to machine, but also difficult to hold. For a firm grip on the bit bodies, a duplex air chuck is used. This is a 4 jaw chuck with the jaws arranged in two pairs, each operated by its own piston in a duplex air cylinder. The work is therefore centered in two crosswise directions while 4 jaws rigidly hold it during machining operations.

The flat platen of the Simplimatic with its independent tool slides permits a compact, effective tooling arrangement with minimum tool overhang. The tooling gives simultaneous machining of a combination of straight and taper-turned diameters, two straight faces, an outside bevel and an internal chamfer. Floor-to-floor time is from 3 to 6 min. for the A.P.I. pin sizes from 3½" to 6⅝". A 2nd operation finishes the surfaces, using same machine and tooling.



Simplimatic tooling for machining cast steel drill bit bodies.



Only 6 min. between rough steel casting and machined bit body.

UNDER-PAR EFFICIENCY... *REPLACE NOW!*

GISHOLT



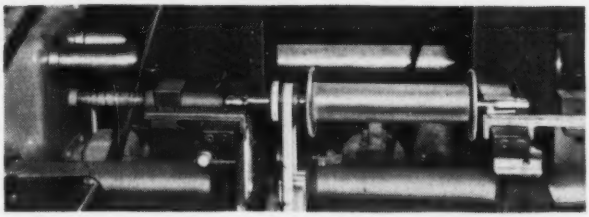
COST CUTTING IDEAS

HIGH-SPEED TEXTILE MACHINES WHIRL FASTER WITH BALANCED BOBBINS

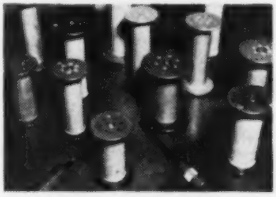
Balancing is Moral of this "Yarn"

Today, one modern high-speed textile machine would outproduce a whole army of women at old-time spinning wheels. One important reason for the amazing speed of present textile machines is the precision balancing of rotating parts on Gisholt Balancing Machines. In fact, precision balancing of bobbins, spindles, flanged spools, etc., on Gisholt 1S Balancing Machines has made possible many important savings. To mention only a few, there are faster operating speeds, improved yarn quality and reduced textile machine maintenance.

An enlightening article on balancing and the major role it is playing in the textile industry was carried in a past issue of *Textile Industries*. Entitled "Dynamic Balancing of Machinery," it was prepared by a high-ranking authority in the textile industry. Reprints of this article are available by writing Gisholt at Madison.



This Gisholt Dynamic Balancer is used to determine the amount of unbalance in a textile spool. (Photos courtesy *Textile Industries*.)



This picture shows a variety of spools which are dynamically balanced on Gisholt Machines.

DYNETRIC BALANCERS

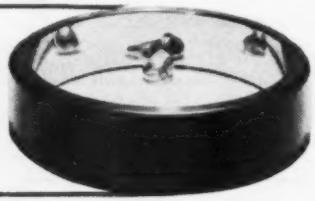
MIRROR FINISH...NOT WHAT IT'S CRACKED UP TO BE

Or, There's More Here Than Meets the Eye!

It's not enough merely getting the finish in micro inches a drawing calls for. You still don't have assurance that the part will have the long life you want from it. The finishing *method* is fully as important as the *degree* of smoothness of the surface.

If your finish is obtained by Superfinishing (as it was in this unretouched photograph), you are reflecting from true base metal. Smear metal chatter marks and grinder flats are all removed. What you actually have are surfaces equal to broken-in surfaces—right as to dimension. Surfaces will last indefinitely.

Superfinish is the successful method of solving problems of both wear and surface roughness. It's covered fully in an 80-page book, "Wear and Surface Finish," which will be sent you free by writing.



Note multiple reflections of finger ring on Superfinished ID of bearing. No smear-metal, chatter marks or grinder flats in this more nearly perfect geometrical surface.

THE GISHOLT ROUND TABLE represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

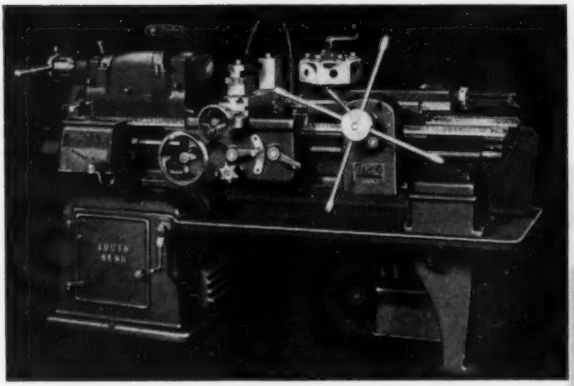
No. 251
564A

GISHOLT MACHINE COMPANY
MADISON 10, WISCONSIN

A general catalog on machines listed below is available on request.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

South Bend No. 2-H

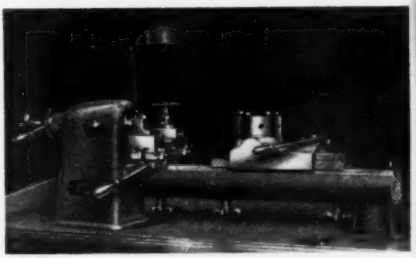


The No. 2-H turret lathe, built by South Bend Lathe Works, South Bend, Ind., can be equipped with universal chuck or independent chuck, for machining castings, forgings, etc., or it can be equipped with hand lever draw-in collet attachment for machining bar stock or tubing.

The power feed ram-type turret has automatic indexing and individual stops for each of the six turret faces. The universal carriage has friction clutch drive in the apron for power longitudinal feeds and power cross-feeds, also lead screw and split nut for cutting accurate screw threads.

The quick change gear box at the headstock end of the lathe provides 48 changes for power carriage feeds and power turret feeds, and for cutting 48 pitches of screw threads, ranging from 4 to 224 per inch.

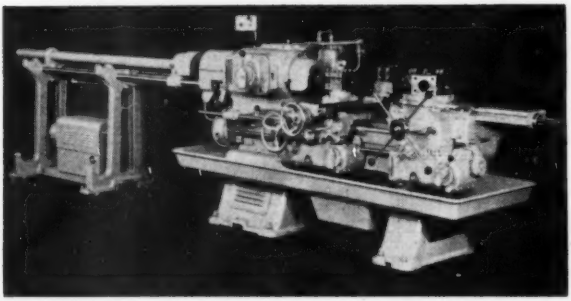
Ames No. EH3



In the Ames unit, made by B. C. Ames Co., Waltham, Mass., levers instead of the customary screws operate the chucks, cutter slile and turret. Bar stock will extend through the headstock spindle. Work is performed so accurately that no second operations are needed.

Stops are provided for the feeds and adequate hold-down bolts move with the attachments along the hand-scraped bed.

The lever operated attachments can be replaced with regular drawing spindle, slide rest and tailstock when the EH3 lathe is to be used for ordinary turning, milling, grinding or threading purposes.



J & L Number 5 Ram Type

This ram type turret lathe, made by Jones & Lamson Machine Co., Springfield, Vt., is equipped with hydraulic bar feed and collet chuck. Machine is designed to handle a wide range of speeds, high for carbide tooling and low for threading, etc. All speeds obtained from a constant speed motor.

Each apron is arranged for 9 power longitudinal feeds ranging from .005" to .100" per rev. Carriage feeds are reversible. Nine reversible cross slide feeds range from .0025" to .050" per rev. Each apron has a single lever feed selector which permits feed changes and pre-selection, whether the machining is cutting or running idle.

Anti-friction bearings used throughout the headstock. All gears are alloy steel, precision finished, including tooth form, after hardening.

Part 3. Specifications of American-built Machines

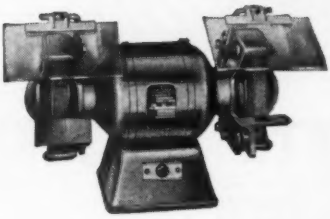
The Bullard Company — **Bridgeport, Conn.**

Model	Capacity (Max. Swing) S=Side Head in Position SB=Side Head Below Table Top	Travel T=Turret Head S=Side Head R=Swiveling Ram Head	Table Speeds and Horse Power	Feeds
VERTICAL TURRET LATHES 30" Cut Master Series	S=34" dia.; SB=44" dia.	T=26" vert.; 30° swivel; S=25½" vert.; 18" horiz.	8.2-300; 6.167-225; 4.1-150; 25-40; 20-30; 15-20 H.P.	16 ratios, .0026"-.500"
36"	S=39" dia.; SB=45" dia.	T=26" vert.; 30° swivel; S=30¼" vert.; 18" horiz.	6.6-240; 4.934-180; 3.3-120; 25-40; 20-30; 15-20 H.P.	do
42"	S=45" dia.; SB=54" dia.	T=30⅜" vert.; 30° swivel; S=37¼" vert.; 21" horiz.; R=30½" vert.; 26⅛" horiz.; 30° swivel	5.5-200; 4.111-150; 2.7-100; 30-50; 25-40; 15-25 H.P.	do
54"	S=58" dia.; SB=62" dia.	T=30⅜" vert.; 30° swivel; S=44¼" vert.; 27" horiz.; R=30½" vert.; 34⅜" horiz.; 30° swivel	4.385-160; 3.289-120.1; 2.193-80.1; 30-50; 25-40; 15-25 H.P.	do
64"	S=67" dia.; SB=72" dia.	T=30⅜" vert.; 30° swivel; S=54¼" vert.; 27" horiz.; R=30½" vert.; 40⅜" horiz.; 30° swivel	3.655-133; 2.741-100.1; 1.827-66.7; 30-50; 25-40; 15-25 H.P.	do
74"	S=78" dia.; SB=82" dia.	T=30⅜" vert.; 30° swivel; S=62" vert.; 27" horiz.; R (Right hand)=30½" vert.; 42⅞" horiz.; 30° swivel; R (Left hand) =30½" vert.; 46⅞" horiz.; 30° swivel	3.29-120; 2.46-90; 1.65-60; (1.24-45 optional) 30-50; 25-40; 15-30 H.P.	do
30" Man-Au-Trol Series	S=32½" dia.; 44" dia. without S	S=23" vert.; 18" horiz.; Main head has 4-face indexing turret	8.2-300; 6.167-225.2; 4.1-150-1 25-40; 20-30; 15-20 H.P.	16 ratios, .0006"-.125"
36"	S=37½" dia.; 45" without S	S=28" vert.; 18" horiz.; Main head has 4-face indexing turret	6.6-240; 4.934-180.1; 3.3-120.1; 25-40; 20-30; 15-20 H.P.	do
42"	S=45½" dia.; 54" without S	S=33" vert.; 21" horiz.; Main head has 4-face indexing turret	5.5-200; 4.1-150.1; 2.7-100.1; 30-50; 25-40; 15-25 H.P.	do
54"	S=58" dia.; 62" without S	S=40" vert.; 27" horiz.; Main head has a 4-face indexing turret	4.4-160; 3.3-120; 2.2-80; 30-50; 25-40; 15-25 H.P.	do
64"	S=67" dia.; 72" without S	S=50" vert.; 27" horiz.; Main head has a 4-face indexing turret	3.655-133; 2.741-100.1; 1.827-66.7; 30-50; 25-40; 15-25 H.P.	do
74"	S=78" dia.; 82" without S	S=57½" vert.; 27" horiz.; Main head has a 4-face indexing turret	3.29-120; 2.46-90; 1.65-60; (1.24-45 optional) 30-50; 25-40; 15-30 H.P.	do

For small tools or light production work, read here about the 1/3 h.p.

Baldor

UTILITY GRINDER 6110

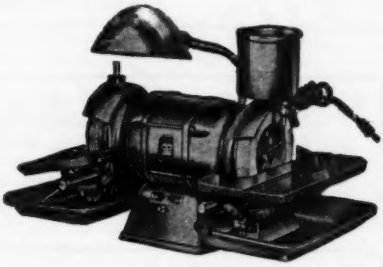


This Baldor Utility Grinder No. 6110 is powered by a 1/3 h.p. capacitor-start, capacitor-run motor that has no commutator, no brushes, no centrifugal switch—a really trouble-free motor that will not burn out, even when repeatedly overloaded.

Complete as shown **$57.00**

The Special Reversible Carbide Tool Grinder shown at the right is a heavy-duty ½ h.p. 3400 RPM grinder for sharpening carbide tools and high speed steel tools. This motor also is the trouble-free capacitor-start, capacitor-run type.

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Baldor Electric Company

Grinders ● *Motors* ● *Battery Chargers*

4368 Duncan Ave. **St. Louis 10, Mo.**

The Bullard Company — Bridgeport, Connecticut

Model	Capacity and Chuck D=Diameter H=Height W=No. of Work Stations	Swing D=Diameter H=Height	Speeds and Horse Power	Feeds
CHUCKING MACHINE MULTIPLE SPINDLE VERTICAL 8″-6 spindles Mult-Au-Matic Series Type D	D=10″; H=10½″; W=5″	D=17″; H=4⅜″	41 changes from 33 to 300; H.P. determined by job, 60 H.P. is max.	82 changes from .0056″ to .2460″
8″-8 spindles	D=10¼″; H=10½″; W=7″	do	do	do
12″-6 spindles	D=10″; H=10″; W=5″	D=17″; H=4¼″	41 changes from 27 to 241; 60 H.P. max.	do
12″-8 spindles	D=10¼″; H=10″; W=7″	do	do	do
16″-6 spindles	D=14½″; H=9¼″; W=5″	D=22″; H=3⅜″	41 changes from 21 to 187; 60 H.P. max.	82 changes: .0073″—.3162″
16″-8 spindles	D=17½″; H=9¼″; W=7″	do	41 changes from 20 to 181; 60 H.P. max.	82 changes: .0093″—.4058″
16-23″-8 spindles	D=23½″; H=10″; W=7″	D=23½″; H=10″		
8″-Type K Series 6 spindles	D=10″; H=10½″; W=5″; one spindle per station	D=17½″; H=4⅜″	41 changes from 100 to 903	82 changes: .0037″—.162″
12 Spindles	D=10″; H=10½″; W=5″; two spindles per station	D=10″; H=10½″	do	do
8 spindles	D=10¼″; H=10½″; W=7″; one spindle per station	D=17½″; H=4⅜″	41 changes from 98 to 883	82 changes: .0038″—.166″
16 spindles	D=9½″; H=10½″; W=7″; two spindles per station	D=9½″; H=10½″	do	do
Types RD & RDH	This series of chucking of turning machine is made in the following sizes: 4 spindles: 10″, 14″, 20″ machine size 6 spindles: 10″, 14″, 20″ machine size 12 spindles: 10″ machine size			

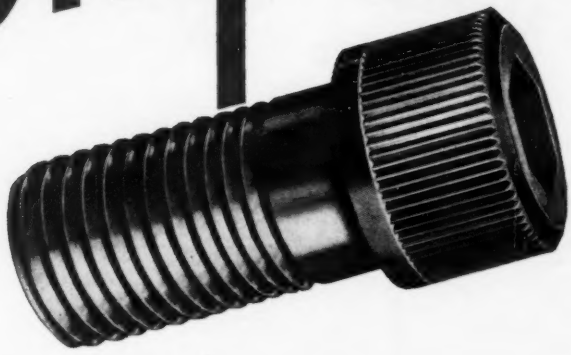
B. C. Ames Company — Waltham, Mass.

Model	Capacity	Swing	Travel
BENCH LATHE WITH TURRET MOUNTED No. EH3	1″ collet capacity; 2″ max. dia. formed and cut-off	8⅛″ over bed	2¾″ working travel of turret

Rivett Lathe & Grinder, Inc. — Brighton, Boston, Mass.

Model	Capacity R=Round; S=Square; H=Hexagon	Swing B=Over Bed C=Over Cross Slide	Travel	Speeds and Horse Power
TURRET LATHE CABINET TYPE Model 918S	R=⅞″ in stationary collet; R=1⅛″ in draw-in collet; R=1¼″ in jaw chuck work passed through spindle; S=⅞″ in stationary collet; S=25/32″ in draw-in collet; H=¼″ in stationary collet; H=31/32″ in draw-in collet	B=9″; C=2 1/16″	3⅞″ travel of cross slide; 2″ travel of universal turning slide; 4 1/16″ travel of turret slide after indexing max.	Low: 150-2500; High: 225-3750

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JENKINTOWN 52, PENNSYLVANIA

Bardons & Oliver, Inc. — Cleveland, Ohio

Model	Capacity R=Round; S=Square; H=Hexagon L=Length of Bar Feed	Swing B=Over Bed C=Over Cross Slide	Longitudinal Travel of Carriage	Speeds and Horse Power
TURRET LATHES No. 1 Geared Electric	With outside feed fingers: R=11/16"; S=1/2"; H=11/16" With inside feed fingers: R=3/8"; S=7/16"; H=1/2"; L=4"	B=11½"; C=4⅞"	10"	150-3000; 175-3500; 1.5 or 2 H.P.
No. 2 Geared Electric	With ratcher bar feed: R=1"; S=11/16"; H=7/8"; L=3"; With power bar feed: R=¾"; S=17/32"; H=21/32"; L=4"	B=13½"; C=6½"	12"	100-2000; 125-2500; 1½ & 3 H.P. or 2 & 4 H.P.
No. 3 Universal	R=1½"; S=1 1/16"; H=1 5/16"	B=15⅜"; C=7½"	19½"	50-1525 depending on motor. 5 or 3 H.P.
No. 5 Universal	R=2"; S=1 7/16"; H=1¾"	B=18"; C=9½"	24"	25-1025 depending on motor. 7½ or 5 H.P.
No. 7 Universal	R=2½"; S=1¾"; H=2⅛"	B=21½"; C=12"	27½"	19-743 depending on motor. 10 or 7½ H.P.
No. 21A Saddle Type Universal	R=2½"; S=1¾"; H=2⅛"	B=21¼"; C=13"	39"	19-743 7½ or 10 H.P.
No. 21B Saddle Type Universal	R=3"; S=2⅛"; H=2 5/16"	do	do	do
No. 22A Saddle Type	R=3½"; S=2 7/16"; H=3"	B=25¼"; C=15½"	42"	13-600 10 or 15 H.P.
No. 22B Saddle Type	R=4½"; S=3 5/16" H=3⅞"	do	do	do

Brown & Sharpe Manufacturing Company — Providence, R. I.

Model	Capacity	Turning Length and Length of Feed	Swing B=Over Bed C=Over Cross Slide	Speeds and Horse Power
HAND SCREW MACHINE (Wire Feed Screw Machine) No. O	⅞" hole through spindle; ⅜" hole through feeding finger	2¼" turning length; 3" length of feed	B=9¼"; C=3⅛"	High: 1100-4500; Low: 220-915; 2 H.P.
No. 1	1¼" hole through spindle; ⅝" hole through feeding finger	4" turning length; 4" length of feed	B=11¼"; C=4⅛"	High: 880-3620; Low: 175-730; 3 H.P.
No.2	1 5/16" hole through spindle; 1" hole through feeding finger	6" turning length; 5" length of feed	B=12½"; C=5"	High: 580-2485; Low: 125-535

Rogers Machine Works, Inc. — Alfred, N. Y.

Model	Capacity	Travel	Spindle Speeds and Horse Power	Feeds
VERTICAL TURRET LATHE	36" max. turning capacity. 4-jaw incl. chuck, 30" dia. 5 positions in turret	Main Turret Head Saddle: 17½" traverse; Tool stake: 27" traverse; Swivel: 20⅛" bearings on tool stake. Set at any angle up to 35 degrees. Side Head Saddle: 17" traverse; Tool stake: will face to 8" dia. min. and 36" max. Swivel: 13½" bearing on tool stake. Set at any angle up to 35 degrees	4.9-91.8 R.P.M. 7½ H.P.	Main Head: .010"-.125" Side Head: .009"-.083"



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SUTTON COLLETS

Logan Engineering Company — Chicago, Illinois

Model	Capacity	Swing B=Over Bed C=Over Cross Slide	Speeds and Horse Power	Stroke of Turret
TURRET LATHE No. 840-2 with automatic apron No. 840*	⅝" with push type collets; ½" with draw-in collets	B=10½"; C=4½"	12 Speeds 30-1450 ½ H.P.	4¼" max.
No. 845-2 Cabinet Model No. 845*	do	do	do	do
No. 850-2 Manufacturing Type No. 850*	do	do	do	do
No. 940-2 No. 940*	1" with draw-in collets	B=11⅛"; C=4½"	45-1500 12 speeds ½ or ¾ H.P.	do
No. 945-2 No. 945*	do	do	do	do
No. 950-2 No. 950*	do	do	do	do
HAND SCREW MACHINE No. 830-2 No. 830*	do	do	do	do

* These models are the same as 840-2, 845-2, 850-2, 830-2, 940-2, 945-2, and 950-2 but with lever instead of pilot wheel on turret, and without turret lock.

Jones & Lamson Machine Co. — Springfield, Vermont

Model	Capacity R=Round; S=Square; H=Hexagon; C=Chuck	Swing B=Over Bed C=Over Cross Slide	Turning Length	Speeds and Horse Power
TURRET LATHES No. 5 Ram Type Universal	R=½"-2½"; S=½"-1¾"; H=½"-2¼"; C=12" Universal	B=21¼" C=13"	Square turret=29¾" Hex. turret=14"	30-1500 or 20-1000 15 H.P.
No. 7A Saddle Type Universal 2½"	R=½"-2½"; S=½"-1¾"; H=1½"-1¼"; C=12" Universal	B=21¼" C=13"	37"	20-1000 or 30-1500 15 H.P. average
do 3"	R=1"-3"; S=1"-2¼"; H=1"-2⅜"; C=12" Universal	do	37"	do
do 3½"	R=1½"-3½"; S=1½"-2½"; H=1½"-3"; C=12" or 15" Universal	do	35"	15-750 20-1000 20 H.P. average
do 4½"	R=2"-4½"; S=2"-3¼"; H=2"-4"; C=12" or 15" Universal	do	33"	do
No. 7B Saddle Type Universal 2½"	R=½"-2½"; S=½"-1¾"; H=½"-2¼"; C=12" Universal	B=21¼" C=13"	34"	20-1000; 30-1500 15 H.P.
do 3"	R=1"-3"; S=1"-2¼"; H=1"-2⅜"; C=12" Universal	do	34"	do
do 3½"	R=1½-3½"; S=1"-2½"; H=1½"-3" C=12" or 15" Universal	do	32"	15-750; 20-1000 20 H.P.
do 4½"	R=2"-4½"; S=2"-3¼"; H=2"-4"; C=12" or 15" Universal	do	30"	do



12 Examples of Cost Cutting

made possible by combining different operations in a YODER Roll-Forming Production Line

NO. 10 Notching; Punching Holes; Stamping Name; Roll Forming and Cutting-to-Length

Here's a steel channel, the main part of a patented mirror support—a big improvement on the conventional wood strips for fastening mirrors to the backs of dressers and other furniture. The first three operations are done on the flat strip, as shown in drawing below, in a Yoder automatic shear type press, placed between the coil box and the Yoder roll forming machine. After forming, the finished shape is cut to length in a Yoder Automatic Cut-Off Machine.

All five operations are performed continuously, in a line of four units just mentioned, tended by a single operator. Production is at the rate of about 3000 pieces per hour.

Yoder roll forming production lines may also include auxiliaries for embossing; coiling or curving; making overlapping, open or closed seams; welding; inserting rubber or felt; filling powders, or injecting liquids into tubular sections, etc.

Yoder engineers are at your service, without cost or obligation, in working out production problems involving such operations. Send for 88-page Book of Information on Cold Roll Forming.

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Complete Production Lines

- ★ COLD-ROLL-FORMING and auxiliary machinery
- ★ GANG SLITTING LINES for Coils and Sheets
- ★ PIPE and TUBE MILLS - cold forming and welding

ENGINEERING YODER MANUFACTURING

Gisholt Machine Company — Madison, Wis.

Model	Capacity R=Round; S=Square; H=Hexagon; C=Chuck	Swing B=Over Bed C=Over Cross Slide	Carriage Travel Longitudinal	Speeds and Horse Power
TURRET LATHES No. 3 Ram Type	R=1½"; S=1⅛"; H=1⅜"; C=8"-10"-12"	B=18½"; C=9⅜"	17"	65-730 standard 5-10 H.P.
No. 4 Ram Type	R=2" or 4½"; S=1⅜"; H=1¾"; C=10"-12"	B=18½"; C=9⅜"	17"	28-730 standard 5-10 H.P.
No. 5 Ram Type	R=2½"; S=1¾"; H=2⅛"; C=12"-15"	B=19¾"; C=10⅜"	24"	do
No. 1L Saddle Type	R=2½"; S=1¾"; H=2⅛"; C=12"-15"	B=19½"; C=15"	40"	18-538 standard 15-20 H.P.
No. 2L Saddle Type	R=3½"; S=2 7/16"; H=3"; C=15"-18"	B=23"; C=19"	46½"	12-346 standard 20-25 H.P.
No. 3L Saddle Type	R=4½" or 6"; S=3 3/16" or 4¼"; H=3⅜" or 5⅛" C=18"-21"	B=28½"; C=21¾"	51"	12-307 standard 25-30 H.P.
No. 4L Saddle Type	Standard chuck size: 24"	B=31⅜"; C=24½"	63"	7-183 standard 30-40 H.P.
No. 5L Sadd e Type	Standard chuck sizes: 28-32"	B=36½"; C=30"	93"	6-162 standard 30-40 H.P.
No. 1F Automatic	Standard chuck sizes: 10"-12"-15"	B=21"; C=7¼"	Longitudinal travel; turret carriage: 16"	Automatic changes, 9 sets of 3: 22-232; 31-470; 45-685; 58-874; 79-1186; 10-15 H.P.
No. 2F Automatic	Standard chuck sizes: 15"-18"-21"	B=25¼"; C=8¾"	Longitudinal travel; turret carriage: 18"	Automatic changes, 7 sets of 4: 17-277; 23-367; 31-505; 42-686; 57-931; 10-20 H.P.
No. 4F Automatic	Standard chuck sizes: 21"-24"	B=36½"; C=17½"	Longitudinal travel; turret carriage: 24½"	Automatic changes, 8 sets of 4: 7-139; 9-181; 12-245; 15-306; 25-40 H.P.

The Oster Manufacturing Company — Cleveland, Ohio

Model	Capacity R=Round; S=Square; H=Hexagon	Swing B=Over Bed C=Over Cross Slide	Turret Travel	Speeds and Horse Power
TURRET LATHE No. 601 WD	R=1½"; S=1 1/16"; H=1 1/16". Bar feed: 3" single feed stroke	B=14"; C=6½"	Maximum travel of turret saddle on ways: 11"	143-1030; 71-514; 147-1034 depending on type of motor. 2/4 H.P.
No. 601 DD	Specifications for this model are the same as for 601 WD. Variation is in motor. 601 DD machine has direct drive and three sheaves. 601 WD has worm drive and six sheaves. Speeds of 601 DD vary from 900-3000; 450-1500; 700-2000 depending on type of motor.			

The Wade Tool Company — Waltham 54, Mass.

Model	Capacity	Swing	Cross Slide Travel	Speeds and Horse Power
HAND SCREW MACHINE No. 5	¾" 1¼x12 TPI Spindle nose	7"	2¼"	315-3300 ¼ or 1 H.P.
No. 7	1" 2x10 TPI Spindle nose	7"	2¼"	do

South Bend Lathe Works — **South Bend, Ind.**

Model	Capacity	Swing	Travel	Speeds and Horse Power
TURRET LATHES No. 2H	1" max. collet cap. through hand lever collet chuck; 1⅜" max. cap. through lathe chuck	16¼" swing over bed and saddle wings; 6⅞" swing over double tool cross slide	6⅛" feed of turret slide; 22½" long. travel of carriage on 6 ft. bed; 34½" travel on 7 ft. bed	Low: 11-350 High: 22-710 2 H.P. (2-speed)
No. CL1006Z	1" max. collet cap. through hand lever collet chuck; 1⅜" max. cap. through lathe chuck	10⅛" swing over bed and saddle wngs; 3 3/16" swing over double tool cross slide; 5⅞" swing over compound cross slide	4" feed of turret slide; 16" long. travel of carriage	Low: 55-245 High: 300-1340 ¾ H.P.
No. CL1005Z Bench Type	do	do	do	do
No. CL930Z	½" max. cap. through collet chuck; ¾" max..cap through lathe chuck	9¼" swing over bed and saddle wings; 3 3/16" swing over double tool cross slide; 5½" swing over compound cross slide	4" feed of turret; 18" long. travel of carriage	Low: 45-232 High: 225-1200 ½ H.P.

The Monarch Machine Tool Co. — **Sidney, O**

Model	Capacity	Swing	Travel	Speeds and Horse Power
HAND SCREW MACHINE Model Speedi-Matic	⅞" with pusher, lever operated; ⅞" with bar feed, air operated	12½" over bed	Work travel of ram type turret: 4"	9 speeds, 40-4000

Procedure Handbook of Arc Welding Design and Practice

Published by The Lincoln Electric Company, Cleveland 1, Ohio, 1950. Over 1200 pages, 1300 photographs and drawings. $2.00.

The ninth edition has been completely revised and re-edited to bring all information up-to-date and to include recent important welding developments. It explains the new procedure for welding all metals commonly welded with regular open arc and hidden arc hand welding, also how to use automatic and semi-automatic hidden arc welding.

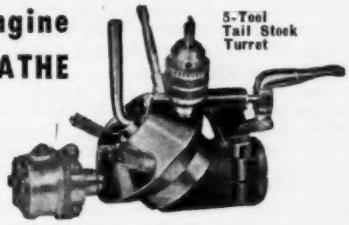
A new chapter gives basic design data such as stress allowables which can be applied to particular design problems. The chapter on machine design has been enlarged to give more information on the welded design of machine toools. Another chapter has been added to this edition discussing weldability to present a comprehensive survey of this important subject.

This volume is recognized the world over as the authoritative source of information on arc welding design and practice and makes an excellent reference handbook for the executive, designer, engineer, shop supervisor and welding operator.

***PRESTO!* Your Bench or Engine Lathe BECOMES A TURRET LATHE**

Several sizes for converting up to 24" swing. For forming, roughing, boring, drilling, tapping, finishing, etc. without stopping lathe or changing tools.

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JEFFERSON MACHINE TOOL COMPANY, 700 W. Fourth St., Cincinnati 3, Ohio



MTBB
MARCH 1951

News of the Industry

Fifty Years Pioneering in Multiple Spindle Drilling Machines

This year the National Automatic Tool Co., Inc. of Richmond, Ind., celebrates its 50th Anniversary. It was in 1901 that a group of six men from the National Cash Register Company developed a new type of drilling machine with multiple spindles and formed a new organization which since has grown into the largest builder of multiple spindle drillers and tappers in the world.

It was somewhere between the bicycle age and the automobile age that the beginnings of multiple spindle drilling were made. A cash register served as a guinea pig to make possible some of the earliest attempts at multiple spindle drilling and tapping. Figure 1 shows the side plate as it was drilled and tapped with the first NATCO multiple spindle hex driller and tapper.

Figure 2 shows a line of six of the same machines today as they are still at work on modern streamlined cash registers. Of course the machines have been repaired and renewed through the years but the same basic design makes them highly productive even today. Other high precision applications in the same cash register plant call for modern streamlined NATCO machines such as the one drilling and step reaming 120 key frames per hour with tolerance plus or minus .005 on 12 inch diameter circle on hole at right angles to side, and plus or minus .001 on centers, figures 3 and 4.

A MAJOR OPERATION

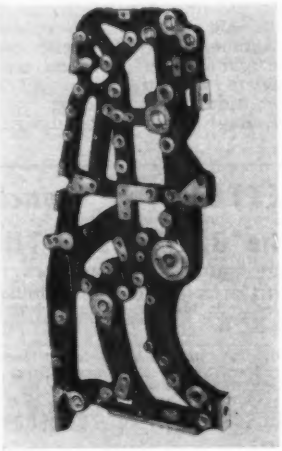
At the start the National Automatic Tool Company was located in the third floor of a building in downtown Dayton, Ohio and occupied 3,500 square feet of floor space. In those early days whenever a NATCO machine was shipped, a major operation took place. Lacking modern freight elevators and large shipping facilities of modern times, the entire window frame had to be removed from the side of the building to permit moving the NATCO machine to a big freight wagon below. This happened each time a machine was shipped.

In 1910 the plant was moved to Richmond, Ind., into larger quarters.

Introduction of the hex head and, in 1901, the independent change of speed for each spindle meant a great forward advance in high speed mass production. The independent change of speed for each spindle as introduced and perfected by NATCO meant that several different size drills could be operated at proper varied speeds. Individual spindles could also remain idle when not needed. This important development in spindle de-

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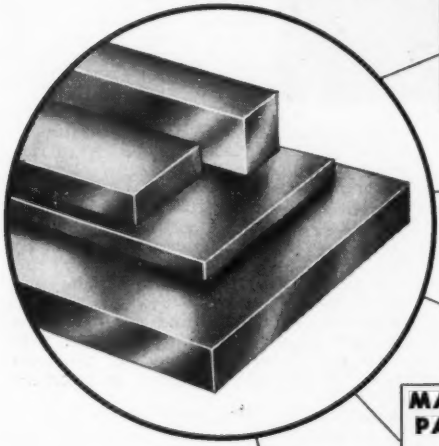
Fig. 1. Cash register side frame as it is drilled on six of the original NATCO machines today.



LENOX

Precision-Master

GROUND FLAT STOCK



TEMPLATES



GAUGES



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MACHINE PARTS



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DIES

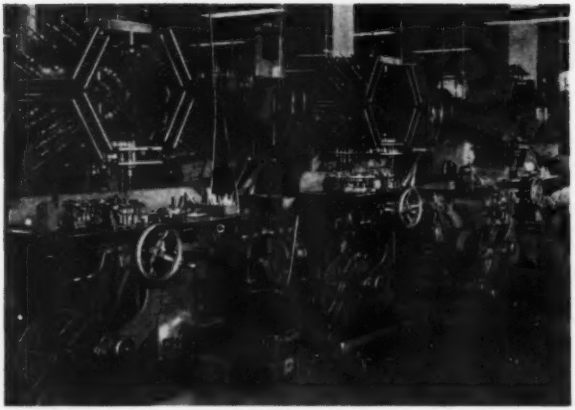


ELIMINATES EXPENSIVE MACHINING OPERATIONS–
PRECISION GROUND, THICKNESS WITHIN .001–
NO DECARB IMMEDIATE DELIVERY

AMERICAN SAW & MFG. COMPANY · SPRINGFIELD, MASS.

Hack Saws Band Saws Ground Flat Stock

"THE TOOLS IN THE PLAID BOX"



• • •

Fig. 2. Line of original NATCO multiple spindle drilling machines with hex heads as they appear today producing 60 side frames per hour.

• • •

sign was generally adapted and is incorporated in NATCO multiple-spindle drillers.

The development of slip spindle plates by NATCO permitted accuracy of work with flexibility. Multi-spindle drilling machines could thus be adapted to production of many different parts simply by adding a new slip spindle plate to the machine with the proper sizes of spindles and individual spindle speeds adjusted as required for utmost efficiency

• • •

Fig. 3. Drilling and step reaming cash register key frame to .001" at National Cash Register Co.



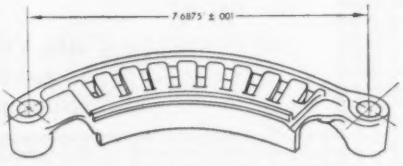
an economy. For still higher production, fixed center spindle boxes were developed, which are still extensively used in mass production.

It was discovered that in machines involving sequencing operation it was useful to use a hole numbering system. By this NATCO plan each hole in every job was assigned a number when the machine was built or adapted to a given operation. This simplified arranging the spindles in machine building and provided quick identification for the customer. Today this practice is accepted procedure.

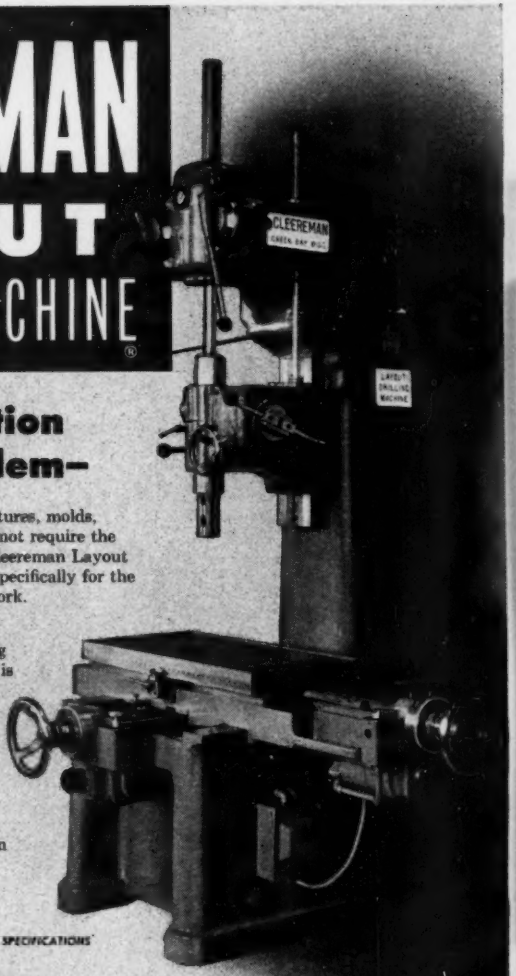
NATCO also pioneered in the use of the rotating table. This permitted the performing of a sequence of multiple operations and provided the means for an operator to load and unload work pieces while machining operations were being performed. The principle of rotating table has been generally adopted today and enlarged upon to include trunion type indexes and straight line indexes.

• • •

Fig. 4. Cash register class 2000 key frame drilled and step reamed to .001" on centers.



CLEEREMAN
LAYOUT
DRILLING MACHINE®



A Modern solution to an Old Problem—

A large portion of tools, dies, jigs, fixtures, molds, jig-less production and other jobs do not require the ultra-precision of a Jig Borer. The Cleereman Layout Drilling Machine has been designed specifically for the efficient handling of this particular work.

Built with many features of design similar to those used in Cleereman Jig Borers, the Layout Drilling Machine is an economical machine capable of accurately locating, drilling, boring, reaming, tapping, etc., with the utmost of operator ease, at a fast rate of production over a long period of time.

Cleereman standards of high quality and proven engineering design and material selection have been maintained in every detail.

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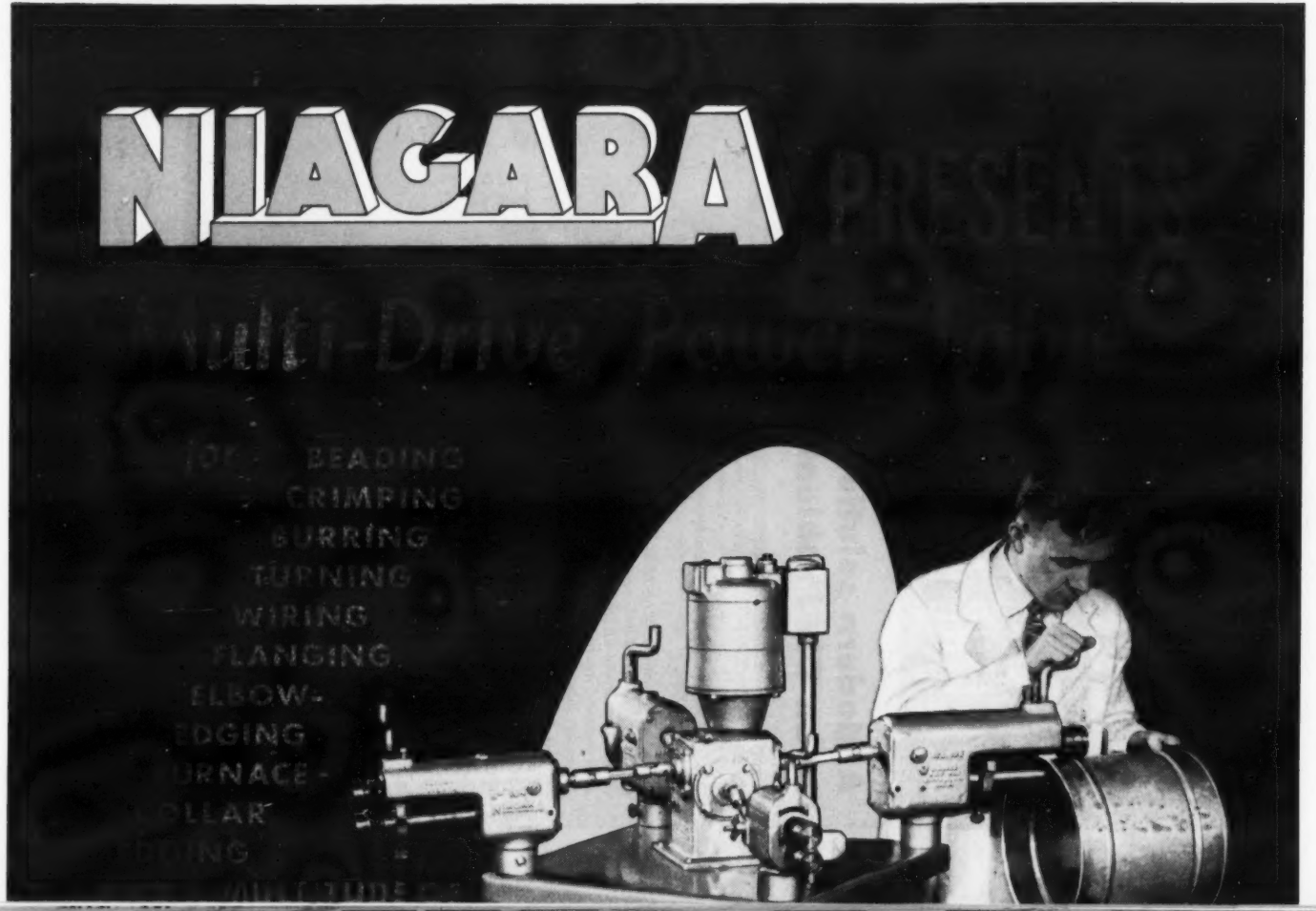
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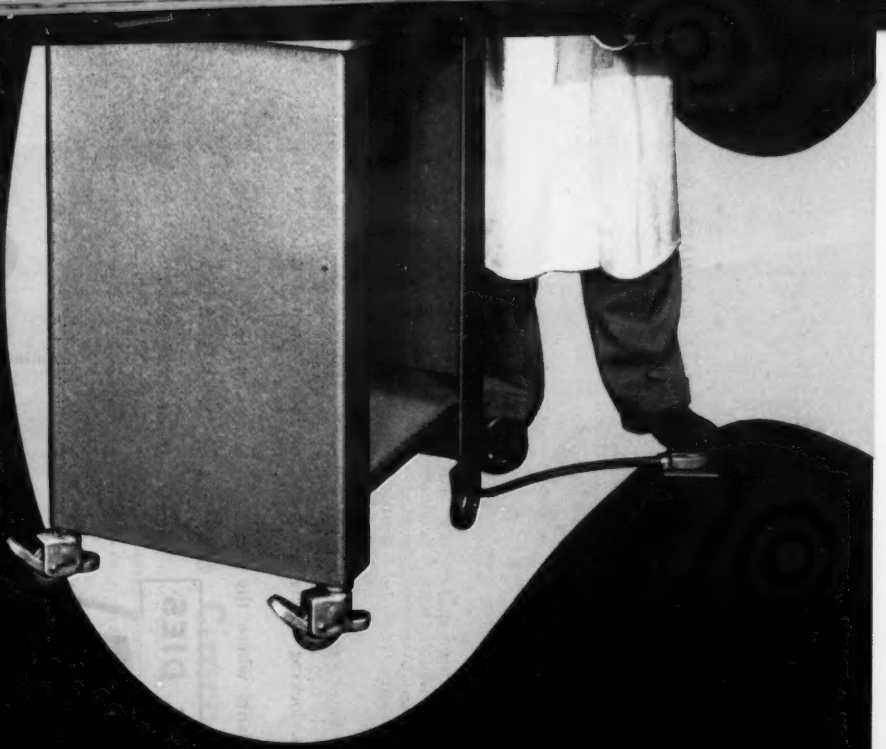
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BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES


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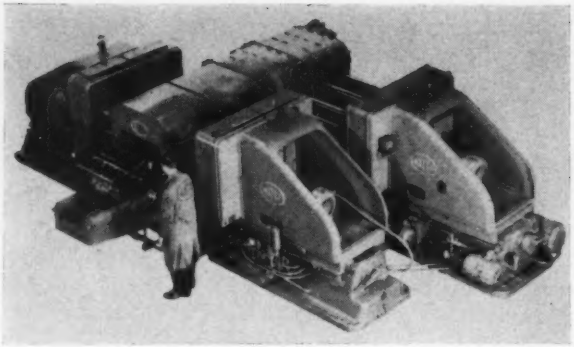
- Low cost hand operated bench machines are instantly converted to power machines that will give many times the output per hour for each machine.
- The electric foot treadle controls the operation of the rolls, freeing the operator's arms so that both hands can guide the work.
- We recommend that each position be set-up for a certain operation so the operator can start to WORK immediately without wasting time hunting tools, rolls and gages.



NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

America's Most Complete Line Presses, Shears, Machines and Tools for Sheet Metal Work

DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK



• • •

Fig. 5. First NATCO Holeway machine shipped in 1932.

• • •

NATCO engineers also introduced multiple tapping with individual lead screws to each tap. They also pioneered in the application of hydraulic feed to multiple spindle drilling.

NATCO engineers were among the first to encourage and adopt electric controls for machines and interlocking cycle phases.

In early automotive plants where the cry was lowered prices through mass production, NACTO developed and installed one of the first processing or transfer type machines . . . a grand daddy of the giant mass production line machines of today.

A few of the various NATCO machines include small, fast, light-sensitive multi-drillers and tappers to large automatic processing machines . . . from single spindle to an unlimited number of

PUNCHES and DIES



for most makes of Hand, Foot, and Power Machines.

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65 styles of Dies

carried in stock for immediate shipment in a large range of round, square, flat and oval sizes.

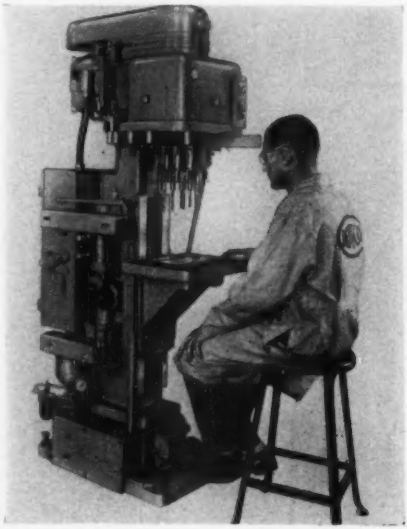
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Fig. 6. Light sensitive driller and tapper.





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This revolutionary cutting fluid is tops with metal cutting operators because Cimcool° makes jobs better. And no wonder! Cimcool is superior to old-fashioned coolants because it is a *chemical emulsion* incorporating a radically new and different principle in cutting fluids.

Operators say Cimcool is the biggest working improvement in years because "it's clean . . . doesn't soil hands or clothing . . . can't smoke . . . can't burn . . . virtually eliminates rancidity and foul odors . . . leaves no hazardous slippery film on hands, machine, work or floor . . . contains no skin irritants . . . and cools so fast that tools and chips actually stay cool to the touch."

You'll get better production when you make jobs better with Cimcool. Let a demonstration in one of your own machines convince you. Just write us and we'll have one of our Cincinnati Milling-trained machinists call on you. Or if you prefer, send for our free booklet "CIMCOOL Gives the Answers." Address Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

°Trade Mark Reg. U. S. Pat. Off.

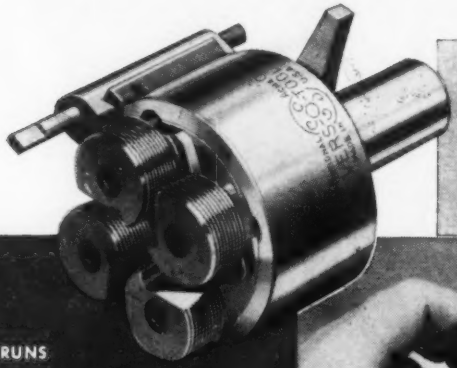


A Production-Proved Product of
THE CINCINNATI MILLING MACHINE CO.

for 85%
OF ALL METAL CUTTING JOBS

GET THESE TIME-PROVED

for the Tops in Threading Performance



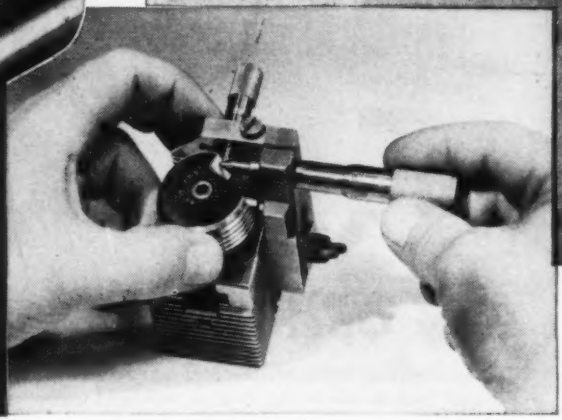
THEY'RE
— LIGHT-WEIGHT
— BALANCED
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FOR LONG RUNS

with Long-Life Circular Chasers

Head Sizes: Straight Threads 1/4" to 9/16"
Pipe Threads 1/8" and 1/4"

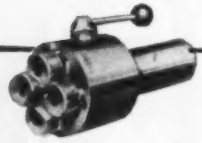
The famous Namco Double Barrel Micrometer Gauge insures identical check on uniformity of all chaser cutting edges, whether you use circular or adjustable blade chasers.



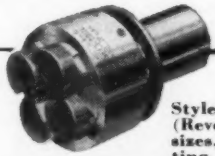
Both Use Ground-Thread Precision Chasers

- Namco Vers-O-Tool Circular Chasers are regrindable through a full 270°—and Vers-O-Tool Adjustable Blade Chasers are designed to give more regrinds than conventional types, with the blade adjustable to proper cutting position for any type of material.
- One micrometer gauge serves both circular and adjustable types. A minimum adjustment of .008" for economical regrinds insures a freshly ground chaser always at correct cutting position.
- Vers-O-Tool Heads, too, are hardened and ground throughout.
- Quick removal and replacement of chasers or blocks is made by loosening only two screws.
- Vers-O-Tool Heads are provided with radial adjustment for wear on all sizes. Diametric adjustment is made by one screw. Both adjustments take less than two minutes.

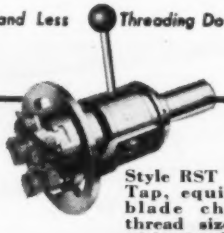
Vers-O-Tools Give You More Threads per Dollar, with Closer Tolerances and Less Threading Down-Time.



Style DS Vers-O-Tool (Non-Revolving Type), 8 sizes, 3/16"–4 7/8" cutting range.



Style DR Vers-O-Tool (Revolving Type), 12 sizes, .056"–4 7/8" cutting range with circular chasers; 6 sizes, 3/16"–1 5/8" cutting range with adjustable blade chasers.

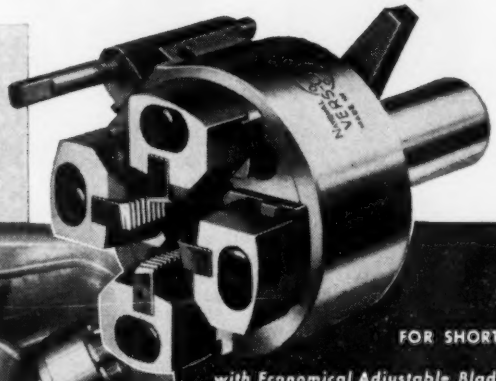


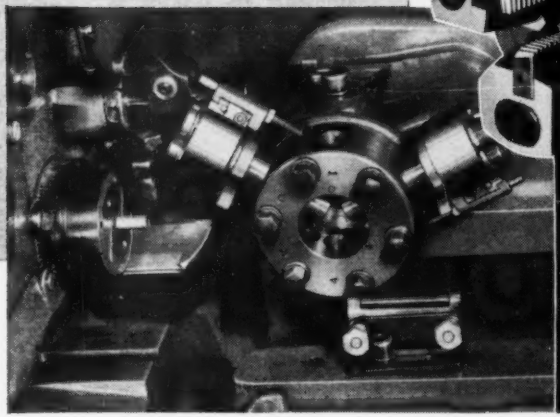
Style RST Collapsible Tap, equipped with blade chasers for thread sizes 1 1/4"–4"; with circular chasers, from 3 1/2"–5".

DBS VERS-O-TOOL TWINS

on Brown & Sharpe Automatics

THEY'RE
— Designed Especially
for B & S Size 00
Size 0
Size 2





FOR SHORTER RUNS

with Economical Adjustable Blade Chasers

Head Sizes: Straight Threads 3/8" and 9/16"
Pipe Threads 1/8" and 1/4"

Typical application of Namco Type DBS Vers-O-Tools on a Brown & Sharpe Automatic. One head is using Circular Hollow Mill Cutters; the other, Ground Thread Circular Chasers.

Vers-O-Tool Heads are Designed for Double Duty

- Namco Circular and Adjustable Blade Chasers are interchangeable, *using the same Vers-O-Tool Head*, size for size, on the $\frac{3}{8}$"–$\frac{9}{16}$" blade types and on the $\frac{1}{4}$" circular type.
- You can use Namco Circular or Adjustable Blade Cutters (interchangeable with same size chasers) for plain turning—and Vers-O-Tools leave no "cork screw" spiral when withdrawn from the work.
- Namco Vers-O-Tools provide close-to-shoulder threading because of positive, trigger-quick tripping action. Head is locked when it should be closed, always open when it should be open—*no blanks.*

For complete information on these *proved-in-use* Brown & Sharpe Type DBS Vers-O-Tools, and others in the famous versatile Vers-O-Tool Family, ask for Catalog D-49.

Stock Delivery on Heads and Chasers for All National Coarse, Fine and Taper Sizes. Special Adjustable Blade Orders, Usually One Week.

The NATIONAL ACME CO.

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Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing



H. W. Bockhoff



E. D. Frank



R. C. Schuerman

spindles . . . from one direction to any number of directions, vertical, horizontal and angular, special or standard . . . and operations range from 1/16″ drill to 14″ or larger bore and face. The materials worked include iron, steel, bronze, aluminum, wood and plastic.

In 1924 Harry Bockhoff became Vice President and General Manager of National Automatic Tool Co., Inc. and on the death of his father he became president in 1928.

The year after NATCO moved to Richmond, Edward D. Frank came to work for NATCO as chief engineer and eventually became Sales Manager, a position he still holds; although today he is Vice President and a Director as well.

Another officer who has been with the company for years is R. C. Schuerman, Treasurer.

Erma B. Hunt has taken an active interest in the company, particularly since the death of her father, W. F. Bockhoff.



A. B. McCrea



E. B. Hunt

She was elected Director in 1929. Also she was elected Operating Vice President and Director in 1940.

Secretary is Allen B. McCrea who came to work for NATCO in 1937 and was elected Secretary the following year.

Russell T. Gilman Opens Milwaukee Office

It was reported in the January issue that the Gilman Engineering and Manufacturing Co. of Janesville, Wis. had opened a Milwaukee office. This was an error. Mr. Gilman has severed all connections with the Gilman Engineering and Manufacturing Co. He has opened a Milwaukee office to represent top precision machine tools, an office with which the Gilman Engineering and Manufacturing Co. has no connection.

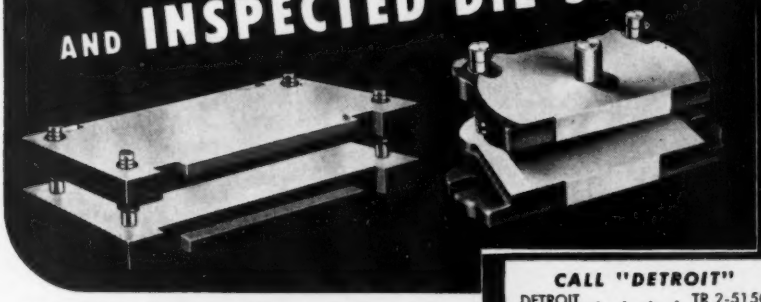
Mr. Gilman brings to his new enterprise 15 years of successful fine machine tool manufacturing. The offices include a showroom of representative machines. The line includes jig borers; jig grinders; optical comparators; microscopes; toolmaker's lathes; Swiss automatics; gear hobbers; burnishing machines and pinion cutters.



Offices are located at 525 E. Michigan St., Milwaukee, Wis.

SAVE MOUNTING COSTS INCREASE PRODUCTION RUNS

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Robert L. Porter, Sales Manager R and L Tools

R and L Tools, 1825 Bristol St., Nicetown 40, Pa., announces the appointment of Robert L. Porter as Sales Manager



for their line of production tools for screw machines and turret lathes. Mr. Porter comes to R and L Tools with a background of experience in the manufacturing and distribution of industrial products covering the past fifteen years.

Richard H. DeMott President of SKF

Beginning as a salesman with SKF Industries, Inc., in 1910, Richard H. DeMott recently became president of the firm, succeeding William L. Batt, who resigned recently to return to government service as chief of the E.C.A. mission to Great Britain.

Mr. DeMott, vice president in charge of sales since 1948, has been a leading pioneer in the use of anti-friction bearings in the papermaking, textile, railroad, electric motor, and other industries. His early positions included those of draftsman, salesman, a power engineer with the Public Service Company of New Jersey before becoming affiliated with SKF in 1915.

Sharpe and Hatch New B & S Officers

At the regular quarterly meeting of the board of directors of Brown & Sharpe Mfg. Co., Providence 1, R. I., which took place on Nov. 29, 1950, two new company officers were named, as



A *BETTER* ENGRAVER AT *LOWER* COST

The 2 and 3-Dimensional

MICO

Fills the long-felt need for a portable, inexpensive and dependably accurate machine for making small dies, molds, templates, etc. Extremely simple to operate.

NOTE THESE SUPERIOR FEATURES

- Engraves 2 or 3 dimensions.
- Pantograph permits 4 reduction ratios.
- Micrometric depth control graduated in thousandths of an inch.
- Entire spindle assembly removable to facilitate cutter grinding.
- Rugged cast iron construction with exclusive adjustments for insuring quick, accurate setting.

SEND FOR COMPLETE SPECIFICATIONS AND ATTRACTIVE PRICE LIST

MICO INSTRUMENT CO.

78 Trowbridge Street
Cambridge, Mass.



Henry D. Sharpe, Jr.



Paul R. Hatch

• • •

follows: Henry D. Sharpe, Jr., was elected a vice president; Paul R. Hatch was named assistant secretary of the firm.

Sharpe was graduated from Brown University in 1944; serving three years of active duty in the U.S. Navy, he entered the employ of Brown & Sharpe in 1946, utilizing the next two years in a training course. Upon its completion, he was assigned to the administrative offices. In November 1948, Sharpe was elected an assistant secretary; he became a company director in April 1949.

Paul R. Hatch entered the employ of Brown & Sharpe in 1927; since that time he has been associated with the sales department, having served in sales offices in Syracuse and Detroit, and as manager of the New York office in 1939. In 1941 he was transferred to Providence to direct small tools sales; he became department head in 1947. Hatch also serves as general sales director of the company.

Three promotions of major importance were announced today by Ralph J. Kraut, president and general manager of the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

Mr. Edgar L. McFerren was made chief engineer, succeeding Mr. K. F. Gallimore who will continue as a director and vice president and consulting engineer.

Mr. Fred C. Freund was appointed assistant works manager, replacing Mr. E. L. McFerren as assistant to Mr. W. E. Rutz, executive vice president and works manager.

Mr. Ray G. Commo was promoted to supervisor of personnel and will head the Industrial Relations Department.

STOP DUSTS *with* DUSTKOP

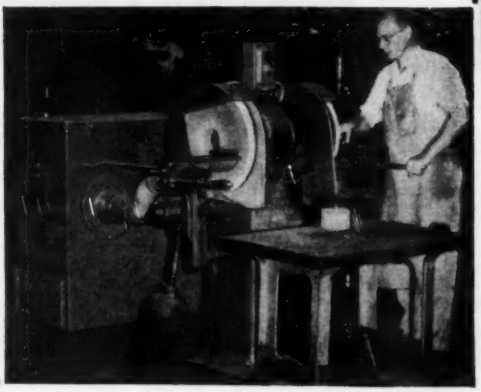
- Surface Grinders
- Tool Grinders
- Cutter Grinders
- Abrasive Belts, Discs
- Polishing, Buffing . . . . . any industrial dusts.

Send now for new Catalog 605b. Describe dust problem for recommendation by return mail; no obligation.

AGET-DETROIT CO.

205 Main St. Ann Arbor, Mich.

22 different Dustkops
300 cfm to 10,000 cfm
available from stock . . . dusts from





Saves Time on deburring, facing, chamfering, center drilling, reaming operations . . .

Designed to speed tube, pipe, and rod end-finishing work of any size or length up to 2" diameter. Has a new-type chuck and clamping unit, automatic swing-type stock stop, interchangeable jaw inserts, multiple tool holders, precision spindle bearings, ½ hp. motor, 8-speed sheave. Portable, weighs only 170 lbs. Fast, easy to operate, has quick change-over features. Forward movement of operating lever, clamps piece, removes stock stop, feeds work to cutters. Operator always has one hand free for loading. Saves time. Typical production: 400-500 tube ends per hour. Speeds output.

Write for Free Bulletin





698 WALNUT AURORA, ILLINOIS

Get more facts today on this new cost-cutting tool. Larger models up to 5" capacity also available.

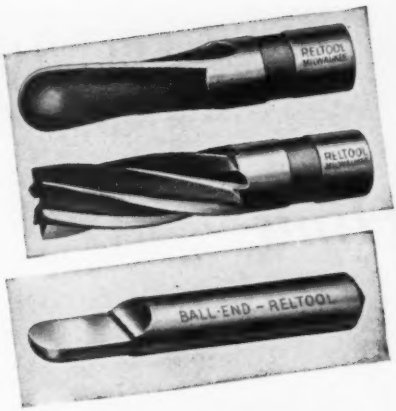
For long-run work ask for data on semi-automatic models with foot switch control.

Cordiner President of G.E.

Ralph J. Cordiner, of New York, was elected president of the General Electric Company to succeed Charles E. Wilson, named chairman of the new Defense Moblization Board. Mr. Wilson submitted his resignation to the Board of Directors and announced that he was severing all connections with corporate and banking institutions.

Mr. Cordiner, who has been associated with General Electric for 24 years and has served as manager of five of the company's departments during that period, has been Executive Vice President and a director of the company since 1949. He assumes his new duties immediately.

Kenneth M. Allen was elected a director at the annual meeting of the Board of Directors of the Rockford Machine Tool Co., Rockford, Ill., manufacturers of Rockford Hydraulic Shapers, Planers, Slotters, Shaper-Planers and Rockford Economy Lathes. Mr. Allen has been with Rockford Machine Tool Co. since 1935 and will continue to serve the company in his present position as sales manager.



DIE SINKING CUTTERS by RELTOOL
Available from Stock



Now you can get prompt delivery on the popular types and sizes of Reltool Die Sinking Cutters... either through your Industrial Distributor or Direct from Reltool. This includes most commonly used sizes in Tapered Flute and Ball-or-Square-End Types with straight shanks, and Die Sinking Routing Cutters (Single Lip End Mills).

Don't wait . . . order Reltool Die Sinking Cutters for prompt delivery from stock!

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RELIABLE METAL CUTTING TOOLS
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Allegheny Ludlum Advances Three—Election of Edward J. Hanley as president and Clark W. King as executive vice president of Allegheny Ludlum Steel Corporation was announced today by H. G. Batcheller, chairman of the board, following a meeting of the board of directors. Mr. Hanley, presently serving as executive vice president, will succeed Mr. E. B. Cleborne, who announced his resignation effective December 31, 1950. Mr. King, who is now president and treasurer, succeeds Mr. Hanley and will retain the position of treasurer. Mr. Cleborne will continue to serve the company as a director and vice president.

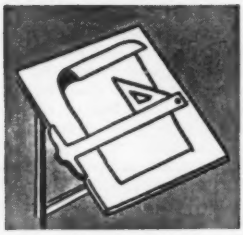
The retirement on December 31, 1950, of Frank B. Lounsberry as vice president and technical director and the appointment of W. B. Pierce, presently manager of the company's sales development and engineering service department, as technical director were announced at the same time.

Appointed General Manager Edmund J. Klonowski has recently been appointed General Manager of the Punch Division of The Pivot Punch and Die Corp. of North Tonawanda, N.Y. under an expansion plan which has involved doubling the size of the plant and tripling its production.

Townsend and Cherry Rivet Merge—Completion of a merger on January 1 of the Townsend Co., New Brighton, Pa. and the Cherry Rivet Co., Los Angeles, Calif., was announced today by F. R. Dickenson, president of the Townsend Co. Mr. Dickenson said that the west coast plant will operate as the Cherry Rivet Co., Div. of Townsend Co. William B. Hubbard, former president of Cherry, has been elected to the Townsend board of directors and will be Managing Director of the Cherry Division.

The Cutting Tool Manufacturers Association at its annual meeting in December reelected Emil Gairing of The Gairing Tool Co. president. Walter Fuller of the Fuller Tool Co. was elected vice president and R. S. Spencer of Detroit Boring Bar Co. was reelected treasurer.

The following were elected to the board of directors: Gordon J. Birgbauer of Super Tool Co.; K. R. Beardslee of Carboloy Co., Inc.; J. I. Schultz of National Broach and Machine Co.; R. G. Michell of Eclipse Counterbore Co.



MTBB
MARCH 1951

Shop Hints

Drill Jig for a Machine Tool Detail

ROBERT MAWSON

When making any mechanical product it is advisable, in some cases necessary that the several details which comprise this equipment be machined interchangeably. With this procedure the manufacturing costs are reduced both when machining the parts and also on subsequent assembling work. This necessity also holds true on the machine tools on which special equipment, jigs, fixtures and the like, are used. If the machine tool is not precision made the tendency will be that the parts produced on the machine tool will also be inaccurate.

To meet these requirements the modern machine tool builder uses well designed and made special production equipment when building their product. In the illustration figure 1 is shown a Pedestal Door Upper Bracket, made of cast iron, which is one of the details used on one type of machine tools built by The Taft-Peirce Manufacturing Company, Woonsocket, R.I. When making this detail the first machining operation is to finish the bottom surface.

The next operations are to drill one 21/64 inch hole through which is then counterbored 5/8 inch for a depth of 1 1/8 inch, drill two 21/64 inch holes through which are then counterbored 29/64 inch for a depth of 5/16 inch and the jig used is shown in figure 2.

This drill jig is made with a cast iron body **1** finish machined on the surfaces **f**. Between finish surfaces on the two vertical walls of the jig is placed, a machine steel, pack-hardened cover 2 which is machined to be a good sliding fit between the wall faces. This cover is provided with a vee shaped block which is used to locate the workpiece. The cover is held in the machining position with a threaded hinge bolt 3 machined to slide in a slot formed in the vertical wall of the jig body.

The workpiece is positioned at the rear with two tool steel shouldered pins 4 which are hardened to resist wear. A tool steel, hardened and ground, bushing 5 is accurately located to drill the 21/64 inch hole in the boss of the workpiece. Two other tool steel, hardened and ground, bushings 6 are positioned for drilling the holes through the flange of the piece. The cover 2 and hinge bolt 3 each rotate on a tool steel pin 7 which fits holes in the vertical wall of the jig and details noted.

The workpiece is held in contact with the positioning pins 4 with two steel square headed set screws 8. The cover 2 is held down on the workpiece with a steel hexagon nut 9 tapped to suit the thread on the hinge bolt 3.

To use the drill jig:—The nut 9 is first screwed back to enable the cover 2 being moved upward, a slot in the end of the cover permitting this motion without the necessity of taking the nut from the hinge bolt.

One of the workpieces, to be drilled, is then placed in the jig. The cover is now swung into the machining position and fastened with the nut 9 after the hinge bolt has been rotated over the cover. As the cover is moved down over the workpiece the vee shaped surface on the cover contacts the piece and thus locates it in position. The two set screws 8 are next tightened to force the workpiece against the positioning pins 4. The workpiece is now accurately located and securely held in place for the machining operation.

The jig is now placed with the front surface (Upper view) on the drill press table and a 21/64 inch hole drilled through the boss of the workpiece, the



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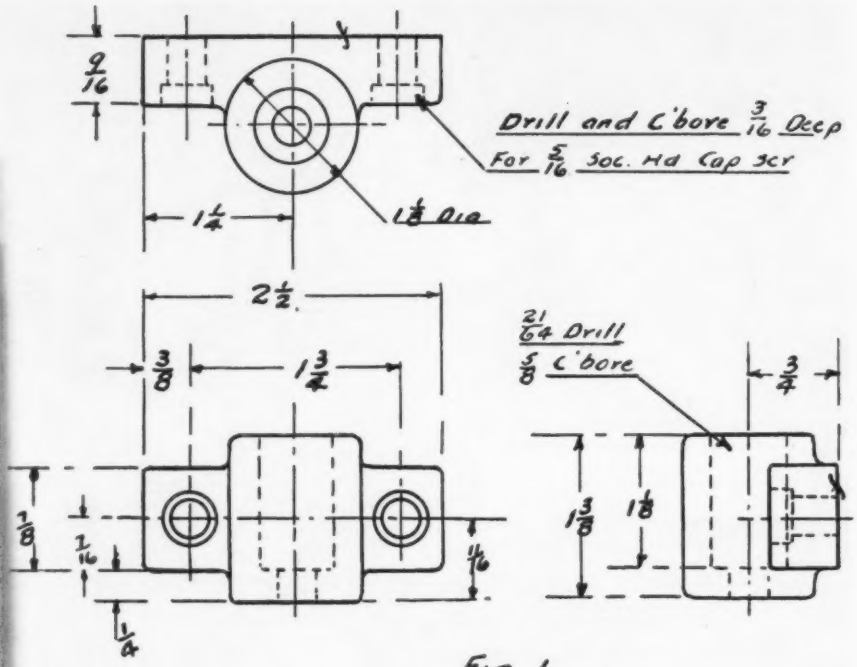


Fig 1

tool being guided in the bushing 5. The jig is then reversed with the rear surface now resting on the table and the drilled hole is counterbored ⅝ inch diameter for a depth of 1⅛ inch.

The drill jig is next placed with its upper surface, (lower view) resting on the drill press table and two 21/64 inch holes drilled through the flange, the drill being guided in the bushings 6. The jig is now reversed and its lower surface placed on the table and the two drilled holes are counterbored 29/64 inch for a depth of 5/16 inch.

To remove the finish drilled and counterbored Bracket it is only necessary to move back the two screws 8 for a short distance, screw back the nut 9 so that the cover 2 can be rotated from the jig's closed position and the workpiece can be lifted out of the jig.

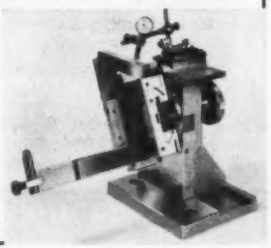
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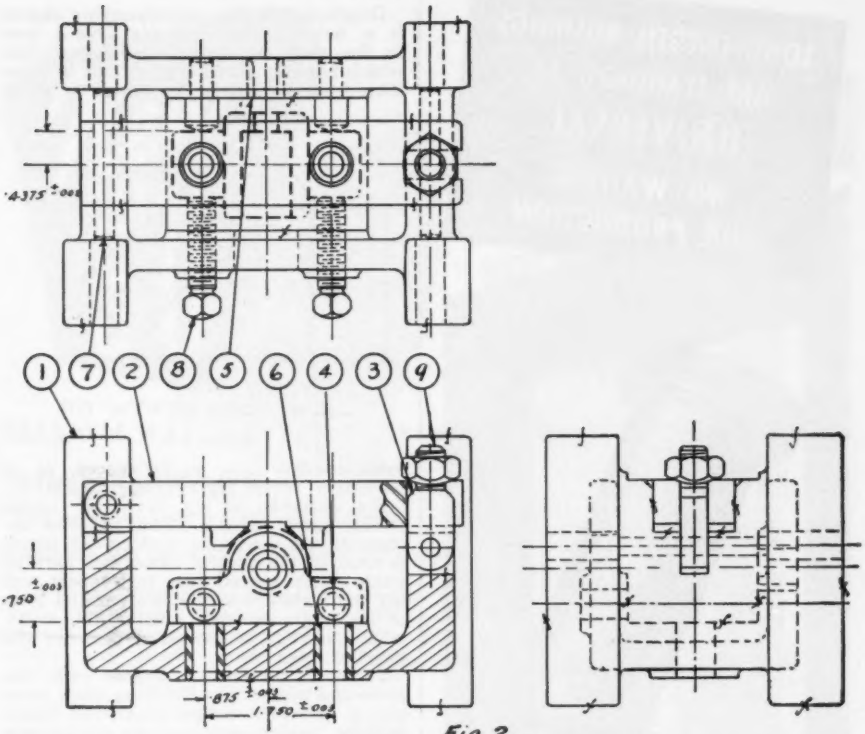


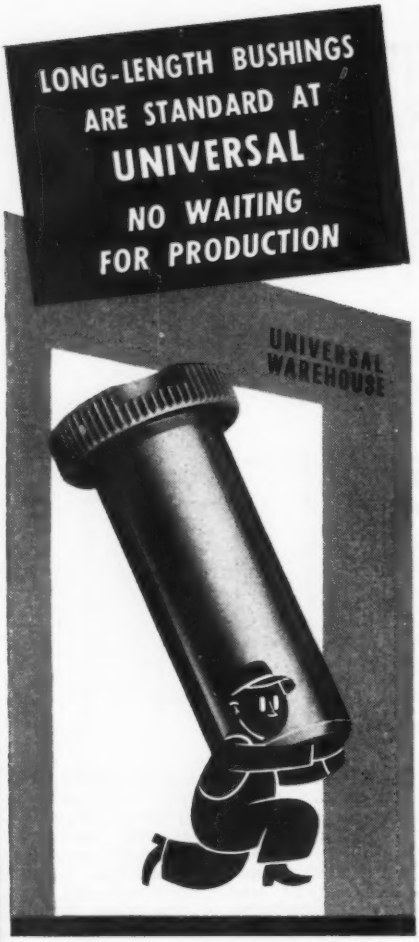
Fig 2.

this drill jig is the raised boss or surface on the inside at the rear. It will be noticed that this surface has a similar contour as the outline of the workpiece. With this feature it is possible to see if the Bracket located in the jig is a perfect casting otherwise the two contours would not be in alignment. With this checking detail the machining of a workpiece, which would be found unsuitable at assembly, is prevented and only acceptable castings would be machined.

This drill jig locates the workpiece positively, holds it securely and with the open construction the locating of the piece can be easily observed and thus prevent misplacing of the piece for the machining operation.

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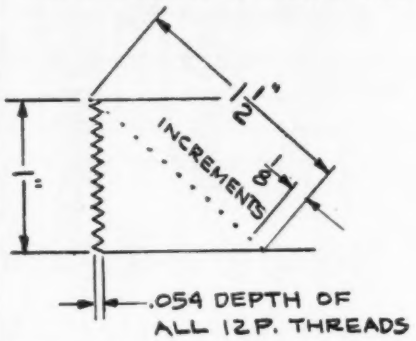
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Short-Cut for Layout

Illustrated in the accompanying sketch is a helpful short-cut for layout men in the shop or engineering department, which has numerous applications in cases where it is desired to divide a given



measurement into equal spaces, as is necessary when laying out threads.

For example, to lay out a 60° angle, twelve pitch thread, select an even dimension on the scale, such as ⅛" which is used in the sketch. Draw two parallel guide lines spaced one inch apart and lay the scale across the two parallel lines at an angle so that twelve times ⅛", which is 1½", is measured between the parallel lines.

Point off twelve ⅛" spaces from the scale and project parallel lines from these points down to datum line. The result will be twelve equal spaces in the one inch measurement.

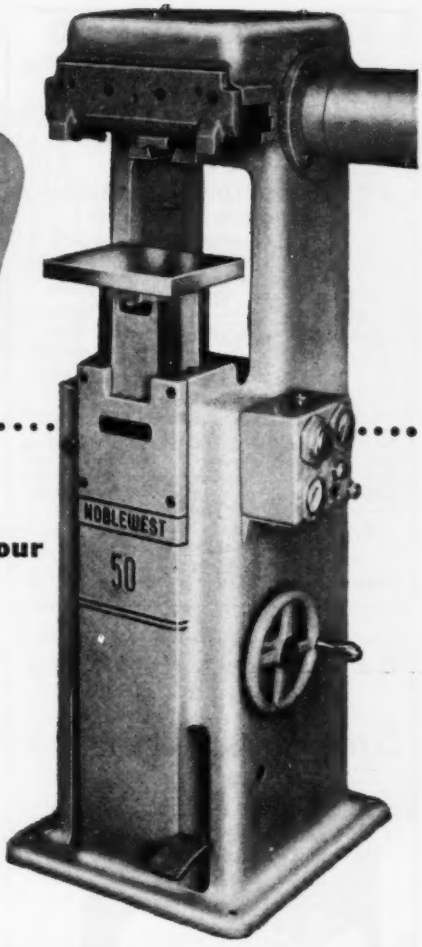
The value of this method lies in the use of standard scale dimensions and any desired values can be substituted for those shown in the accompanying sketch.

Non-Jam Locators for Welding Fixtures

by H. G. Frommer

When building larger welding or tacking fixtures it often becomes necessary to locate the individual component parts quite accurately. If for some reason locators must be provided on opposite sides of such fixtures, the stresses and distortion of the welding operations prevent easy removal of the welding due to binding. This difficulty can be overcome by use of "releasing" locators, locators which can be pulled back to give clearance, yet which can be reset to the original accurate location without much loss of time. Such a locator of simple design is shown here. The fixture base A is provided with

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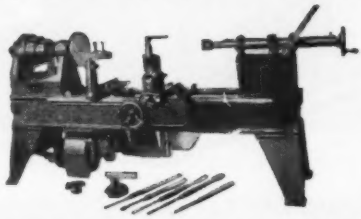
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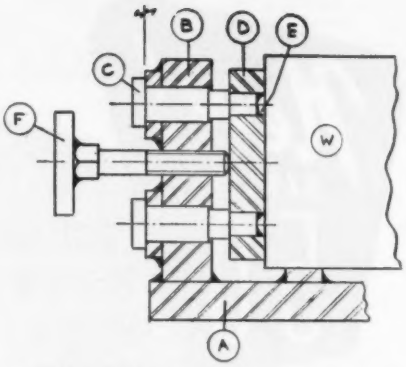
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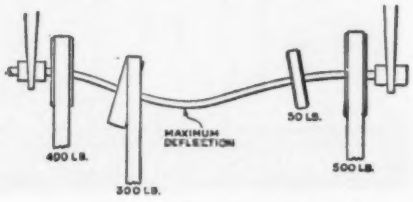
welded uprights **B** wherever locators are desired. Round bosses are welded to these uprights and machined as shown. Holes are bored thru the uprights and bosses to receive the locator assembly consisting of two pins **C** and a plate **D**. Weld **E** is made after insertion of pins and may be just a light tack weld. A hole is drilled and tapped between the bored holes to receive the operating screw **F** made of a set screw with welded T-handle.

Before loading the fixture (one component work piece **W** is shown) the set screw is tightened until the shoulders of pins **C** are tight against the machined surfaces of the bosses. After welding, the screw is released to allow the locating assembly to move to the left giving the necessary clearance for ease of removal of the weldment.

Why Belts Often Run Off Of Pulleys

by W. F. Schaphorst, M.E.

This sketch shows clearly why belts often refuse to remain on pulleys. For instance the belt marked "300 lb." is so far from a hanger that the pull causes the shaft to deflect seriously. On account of that deflection the pulley itself is tilted, as shown, and the belt is bound to run off. The deflection may be so small that

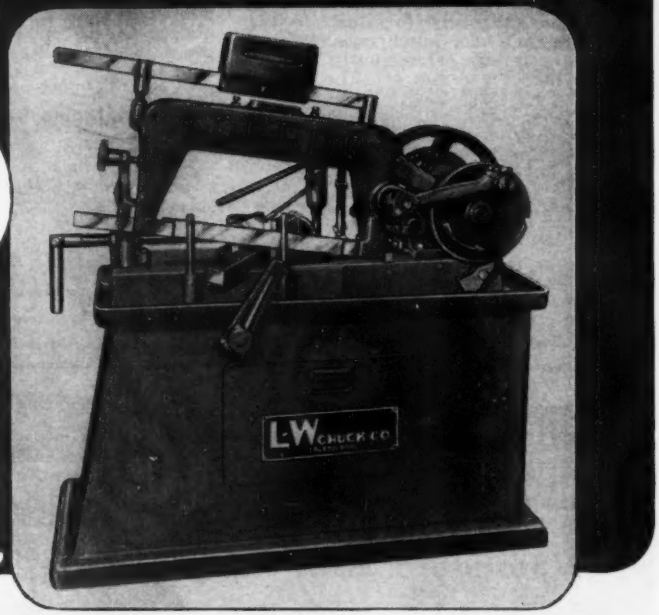


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it cannot be seen with the naked eye, but it is there nevertheless. Another hanger placed between the pulleys marked 300 lb. and 50 lb. would obviously prevent that serious deflection and the belts would stay on their pulleys.

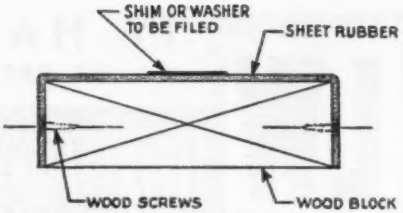
The pulleys marked 400 lb. and 500 lb. are all right because they are close to hangers; consequently their belts are less likely to run off. The belt on the pulley marked 50 lb. is a horizontal belt, but due to the deflection of the shaft the belt on that pulley may also give trouble.

In this sketch the deflection is shown exaggerated purposely to illustrate the idea. It doesn't take much misalignment to throw a pulley off seriously enough to cause the belt to run off. The important thing is: keep the pulleys aligned, always. The belts will then stay on—provided they don't slip too seriously. Slip is another reason why belts run off.

Holder Facilitates Filing Washers

by Roger Isetts

Very thin washers or shims that are difficult to hold when filing can be effectively held with the inexpensive, easy to make gadget illustrated. A piece of



sheet rubber is stretched snugly over a block of wood and secured by means of a couple of wood screws. In use, the washer is placed on top of the rubber, and as the file passes over it, it will depress itself slightly preventing it from slipping.

Prevent Marring Delicate Surfaces

by Roger Isetts

When laying out lines on highly polished work, a small piece of adhesive

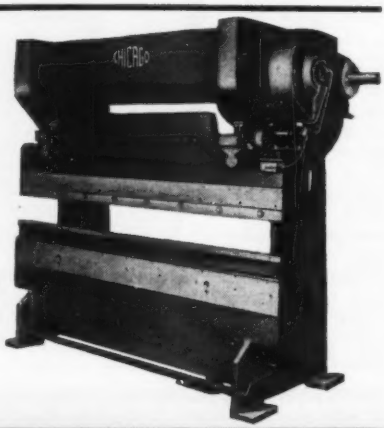


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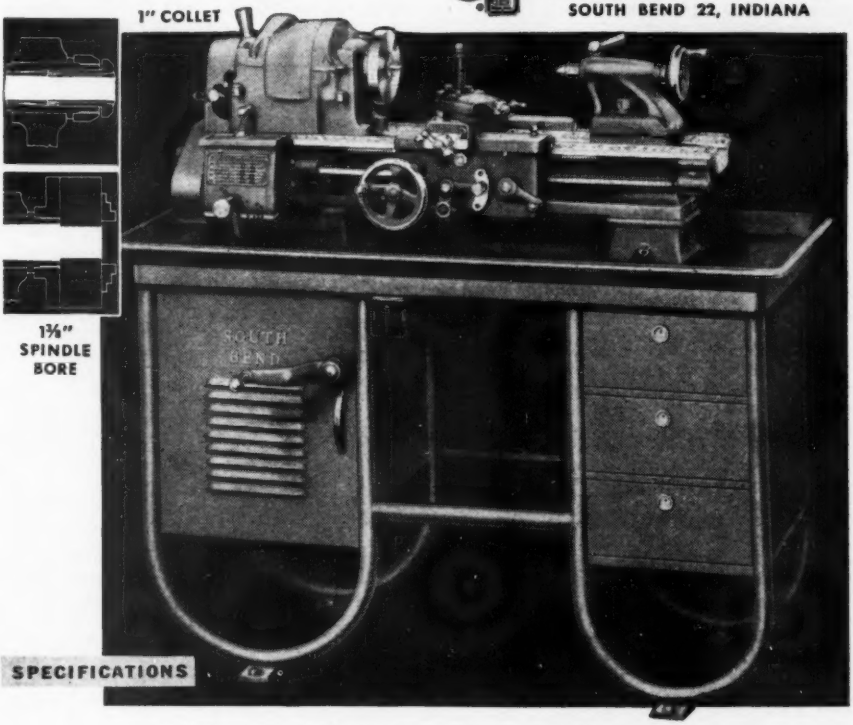
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SPECIFICATIONS

Catalog No. CL187YB South Bend 10"-1" Collet capacity Quick Change Gear Precision Bench Lathe.

SWINGS: 10⅛" over bed and saddle wings, 5¾" over saddle cross slide.
BED LENGTHS . . . 3, 3½, 4 and 4½ feet
COLLET CAPACITY . . . 1 inch
CENTER DISTANCE . . . 14¾ to 34¾ inches
SPINDLE BORE . . . 1⅜ inches
12 SPINDLE SPEEDS . . . 50 to 1357 r.p.m.
CROSS SLIDE TRAVEL . . 5⅞"
POWER LONGITUDINAL FEEDS: 48 R.H. or L.H. . . .0015" to .0836"
48 POWER CROSS-FEEDS . . . . .0006" to .0309"
THREAD CUTTING: 48 R. H. or L. H. pitches, 4 to 224 per inch

or friction tape under one of the divider legs will prevent marking or scratching the surface. If the lines to be scribed must be extra heavy, several layers of tape can be used to keep the point from penetrating.

Design for a Trepanning Cutter

by F. E. Riley, London, England

The trepanning cutter shown in the sketch was designed by the writer to overcome some of the weaknesses that are inherent in this type of tool. Trepanning throws a heavy bending strain upon the drilling machine spindle in which it is mounted and a lot of chatter and digging in of the cutting tool is caused by this. To reduce the bending strain on the drilling machine spindle, the trepanning tool here shown has a spring-loaded center built in, the point of which can engage a center-hole in the workpiece.

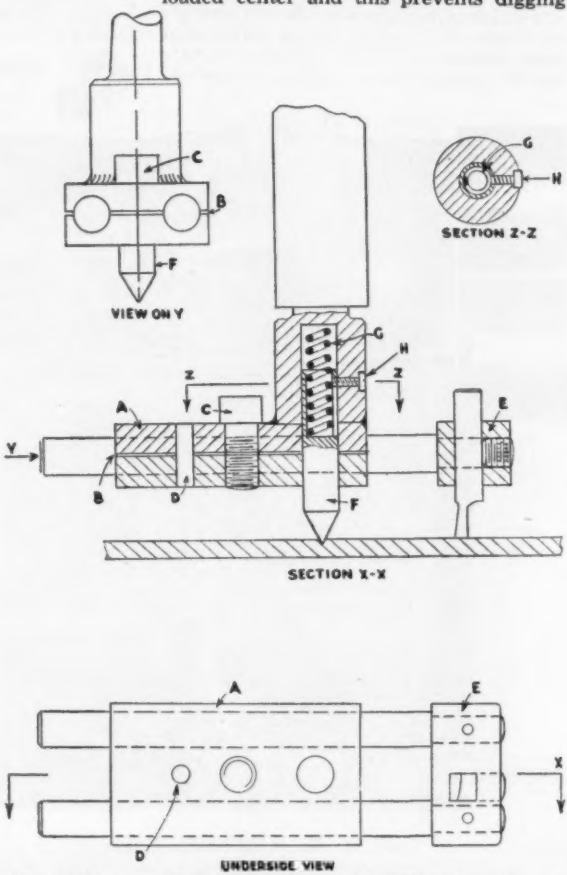
The tool has a strong and rigid cutter arm so that at maximum radius a fair amount of rigidity for supporting the cutting tool is obtained.

The tool consists of a Morse taper shank which is integral with a block-shaped body portion **A**. This is split horizontally at **B** so that when the clamp screw **C** is tightened, the two halves of the split will close on to the circular guide bars. A dowel pin at **D** ensures that the two halves of the body portion will line up longitudinally. The two guide bars are a driving fit in the tool block **E** and are pinned therein to avoid any possibility of the tool block coming adrift.

The center **F** is a close sliding fit in the hole running up the center of the shank and is bored internally to house the compression spring **G**. The center is prevented from dropping out of its guide hole by screw **H** which engages with a slot cut into the wall of the center. The center should be hardened and ground on the exterior surfaces.

The shank and body portion are secured together by welding. The body portion is split after the guide rod holes have been bored.

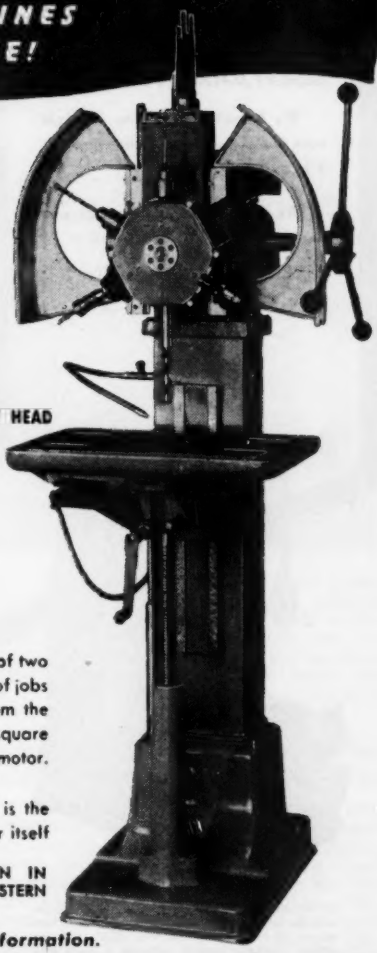
In use, this trepanning tool has proved very efficient since any slack in the end thrust of the drilling machine spindle is automatically taken up by the spring loaded center and this prevents digging into the work by the cutting tool. It can be used just as effectively in the lathe or on the milling machine. With the center removed, the tool becomes an excellent fly-cutter holder whose radius can be adjusted for facing work in the milling machine.



THE *Burgmaster*

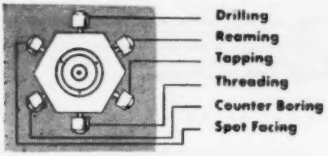
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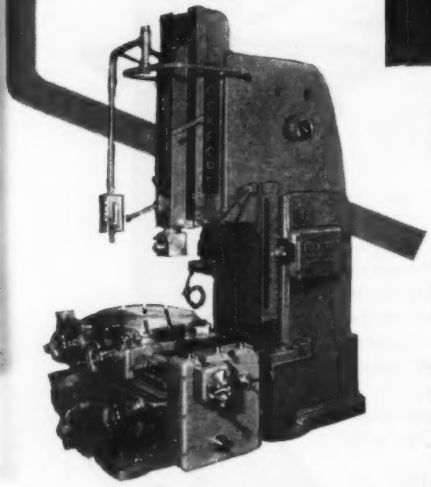
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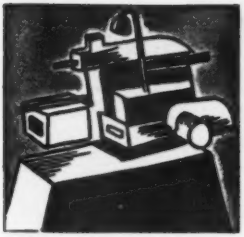
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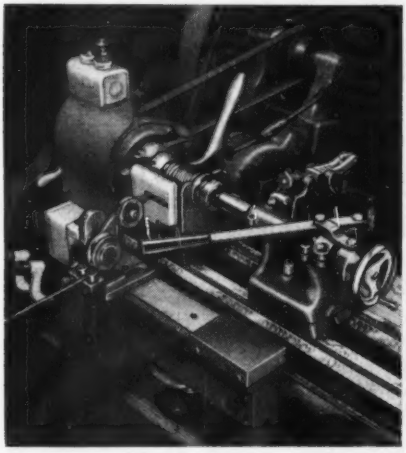
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Modern Tools in Action

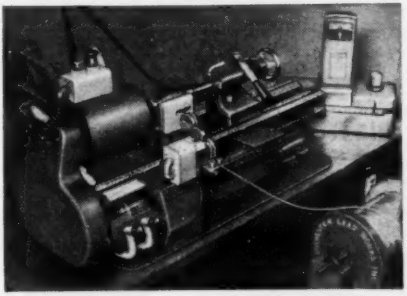
Lathe Adapted As Winding Machine

Recognizing the need for a faster and more accurate solder winding machine, the Rochester Lead Works, Rochester, N. Y. has developed an ingenious and efficient machine for this purpose.

A small South Bend Precision Bench Lathe was used as the foundation of the machine. A special electronically controlled measuring device designed to work in conjunction with an electric braking mechanism was mounted on the lathe. This combination of units resulted in a winding machine capable of producing 216 one-pound rolls of solder, with or without spool, per hour; weight accuracy automatically controlled to not exceed one eighth ounce over. The best production obtained on former equipment was 250 rolls of solder per day with much less weight accuracy. Furthermore, because these rolls had to be run on the heavy side so that none were underweight, considerable waste resulted.



The choice of a South Bend lathe for the foundation of this solder winding machine was made partly because of its



wide range of power longitudinal feeds. The use of the standard quick change gear box feeds, plus the ease with which special ratio intermediate gears can be obtained, drastically reduced the expense involved in obtaining proper feeds for the various diameters of wire solders to be spooled.

Gaging And Segregating Machine For Telephone Equipment Protector Blocks

A new type of automatic gaging and segregating machine for dimensional and load checks of ceramic protector blocks having carbon inserts, which are used in telephone equipment, is made by The Sheffield Corp., Dayton 1, Ohio. The automatic machine is designed for rapid changeover and setup on several different blocks. Up to 3,600 parts per hour can be checked.

Protector blocks are manually loaded into a magazine-type feed and a blast of air cleans the parts as they move down the chute. The machine stops au-

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Hand operated. A giant for work, cuts wire and rods up to ⅝-in. round or ⅜-in. square and band iron up to ⅛-in. by 2-in. Adjustable stop for repeated cuts to same length. Large or small, your shop can use a WONDER CUTTER.

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COLONIAL #3



A More Wear-Resistant Drill-Jig-Bushing Steel

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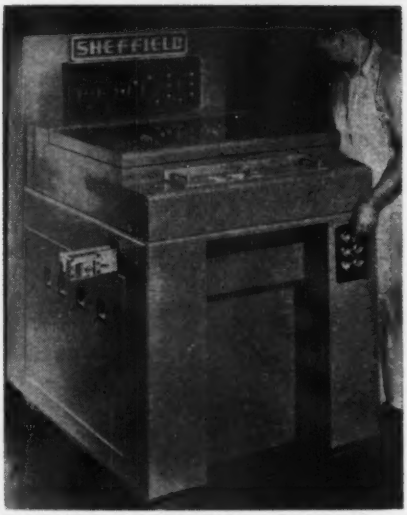
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To reduce your bushing costs, specify bushings made from "Colonial #3"

All standard COLONIAL drill jig bushings are now made from Colonial #3—a new oil-hardening steel having many times the wear-resistance of former bushing steels. Also gives greater uniformity.

COLONIAL BUSHINGS INC.
P.O. BOX 37, HARPER STATION
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Sheffield Automatic Gaging and Segregating machine for telephone equipment protector blocks checks up to 3,600 parts per hour.

• • •

tomatically when fewer than the required number of parts are loaded, thus preventing the machine from indexing while a part is entering the carrier.

A light panel gives visual indication of results of each gaging operation enabling the operator to view the quality trend of the parts. Sheffield Airlectric and Electrichek Heads are used as the gaging mediums. Rejects are segregated into maximum and minimum chutes. Parts passing all gaging stations are indexed to and unloaded at a chute which carries them on an endless belt conveyor outside the machine.

Use Inert-Arc Welders to Fill Contract for More Than a Million Aluminum Cans

Using two General Electric Type WP Inert-Arc welders, the E. S. MacDonald Co. of Montreal is completing an order which calls for 25,000 five-gallon aluminum cans a week for a period of ten months. These cans are to be used for the transportation of acid from Montreal to a rubber plantation in the Malay States.

The company had been experiencing considerable trouble in experimenting



Trimming Formed Parts

AND HUNDREDS OF OTHER CUTTING JOBS are FRICTION SAWN

QUICKER and BETTER

with **Tannewitz**

HIGH SPEED BAND SAWS!



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Friction sawing with Tannewitz High Speed Band Saws is much faster, easier and better than any other method of cutting formed parts, flat sheets of either soft or hard steel, non-ferrous metals, glass, plastics and many other materials. Down-drag of saw is so little that no rest of any kind is needed in trimming formed parts or castings. Savings in time and costs are immense.

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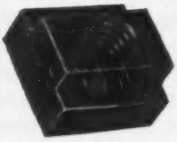
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118 HOLLIER AVE., DAYTON 3, OHIO



General Electric Inert-Arc welders are used in the production of more than a million aluminum cans. Operators are adjusting the electrode holder and travel carriage for making the longitudinal seam weld on the cans.

• • •

with the welded fabrication of these cans. Trial welds with various types of apparatus had been unsuccessful. Finally, a procedure was established for making sound, quality welds with 100 per cent penetration.

The material being welded is type 57-SH aluminum, .032 in. thick. A welding speed of about 26 in. per minute is maintained, using 5 liters of argon gas per minute at approximately 60 amperes. Tungsten electrode, of 3/32-in. diameter, is used.

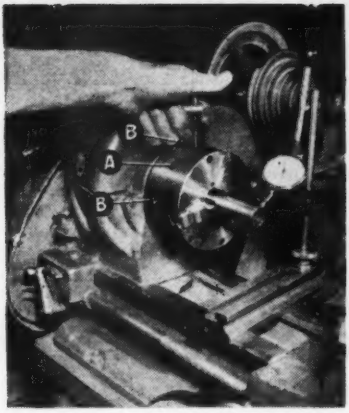
Hardening Primary Pump Hubs For Buick's Dynaflow

A Cincinnati No. 2 Flamatic Hardening machine is shown hardening the primary pump hub, a part of Buick Dynaflow unit. Details of the operations and results are as follows:

On this part, two surfaces must be hardened to Rockwell C 60 minimum, while a flange separating the two areas must show no increase in hardness. One of the surfaces must have full hardness within 3/16" of the soft flange. This flange must be turned and drilled after

Buck AJUST-TRU CHUCKS

HANDLES MORE JOBS THAN ANY OTHER CHUCK!



THIS IS HOW IT WORKS

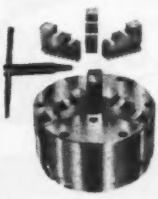
Pinion "A" moves jaws in or out to grip work like any scroll chuck. 4 opposed screws "B" (only 2 shown) bring work to dead center. It's as easy as it sounds. Inexperienced men can center work within .0005 in 3 minutes! Once set dead true, you can machine hundreds of duplicate parts without changing adjustment!

1. **.0005 precision with scroll chuck re-chucking speed.**
2. **Handle collet and step-collet work.**
3. **End most stub arbor, mandrel needs.**
4. **Adapt to dividing heads, grinders, screw machines, lathes.**
5. **Minimum overhang — grips work closer to spindle for greater accuracy.**

THIS is the most amazing chuck advance in 50 years! One Buck chuck—**at ordinary scroll chuck cost**—will handle the work of special equipment worth $250 or more! Take collet work for example. Buck chucks have spindle capacity **by .001** from ⅛" to 1½". 6" chucks have step collet capacity—**by .001**—from ⅛" to 5". That's **part** of the story. Send for all of it.

BUCK TOOL COMPANY

312 Schippers Lane **Kalamazoo, Michigan**



3 Step-Jaw Chuck 3 sizes— 4", 5", 6"



6 Step-Jaw Collet Chuck 3 sizes— 4", 5", 6"



6 Jaw Production Collet Chuck 3 sizes— 4", 5", 6"



Cincinnati No. 2 Filmatic Hardening Machine with special burners produces 140 hubs per hour for Buick Dynaflow transmissions.

• • •

hardening. In addition, two driving lugs adjacent to the second hardened area must also be soft. The heat treatment of this part poses a difficult problem for the metallurgist, both in selection of material and equipment. The Flamatic solved this problem. The two surfaces are hardened simultaneously to Rockwell C 60 minimum without increasing the hardness of the flange or lugs. Distortion is held to a minimum and the parts are easily inspected for pattern.

This is accomplished at a high production rate with no rejections. The Flamatic is placed directly in the production line, thus simplifying handling and at the same time eliminatng the float of materal usually involved with other types of heat treating. Machining and tool costs were greatly reduced over the previous method used. The Flamatic is easily loaded and automatic in operation. Maintenance cost of the Flamatic is negligible. Machine is made by Cincinnati Milling Mach. Co., Cincinnati, Ohio.

Automatic Lathe Turns, Grooves Cylinder Liners

An interesting operation is the rough and finish turn O.D. and grooving of locomotive cylinder liners. The machine used is a Sundstrand model 16 x 60" type A Automatic Lathe.

The machine has 75 h.p. drive to the spindle, with variable speeds from 15 to 750 r.p.m. The tailstock slides longitudinally on a sub-base and is power-operated by push button. A special front carriage has a 28" wide cross slide, angular feed-in, slow-up, dwell, and tool relief. It has feeds in a range from .0025" to .100" per revolution. A special over-



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Above model G4-2-04 installed in 5 to 20 minutes, delivers enough coolant for 6 to 8 spindle press. It is one of many complete Graymills Coolant Systems which will help you reduce tool costs; increase cutting speeds and improve quality.

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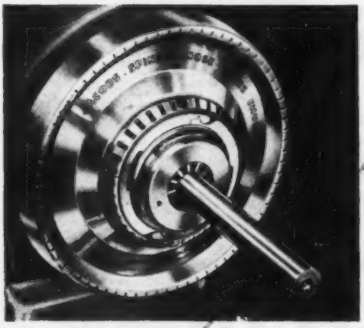


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now...11 do the work of 88

Eleven unique Jacobs Rubber-Flex Collets do the work of 88 split steel collets and will chuck any bar from 1/16" to 1 3/8" diameter. Each collet has a capacity of a full 1/8" range. Extra long steel jaws are always parallel to and in full contact with work. Bonded together with Hycar Synthetic Rubber which will not set and is not affected by heat, coolants, cutting oils.

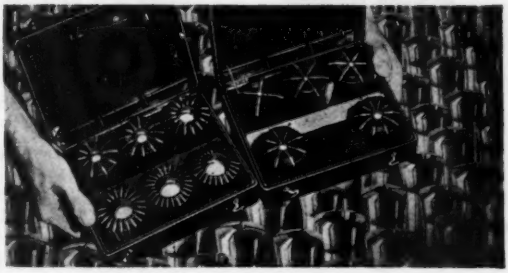
See your Industrial Distributor for Bulletin 50LC giving complete information on this amazing chuck.

The Jacobs Manufacturing Company, West Hartford 10, Connecticut.

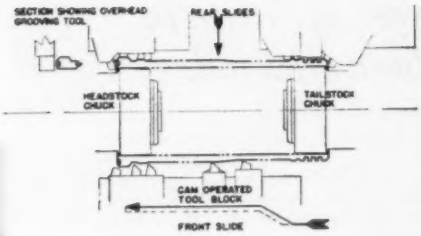
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JACOBS

IT HOLDS



Jacobs Rubber-Flex Collets are used with Jacobs Spindle Nose Lathe Chuck

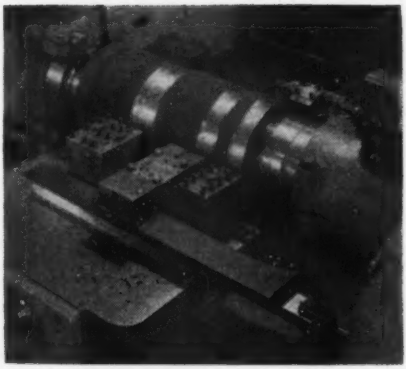


Sketch showing position of tools and slides for turning and grooving locomotive cylinder liners.

• • •

head attachment operates from the front carriage. Two cross feeding rear slides carry tools for turning the collar end and for turning the grooves.

The machine operates in automatic cycle, started by push-button. Rapid advance, feed and quick return of slides are controlled by pre-set dogs on the cycle control disc. The cylinder liner, as shown, is 32″ long by 15¼″ dia. Tools are arranged on the slides for turning 5 different diameters and cutting three



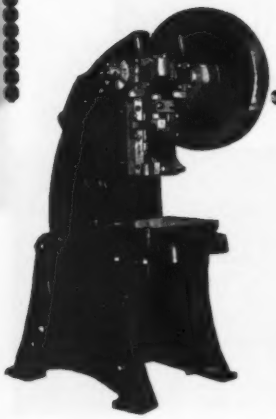
This Sundstrand model 16 x 60″ type A Automatic Lathe is turning O.D. and grooving locomotive cylinder liners.

• • •

.253″ grooves in the O.D. The overhead attachment turns a groove in the end wall diameter. Production is at the rate of 3 liners an hour for roughing cuts and 8 an hour for the finishing cuts. Machine is made by Sundstrand Machine Tool Co., Rockford, Ill.

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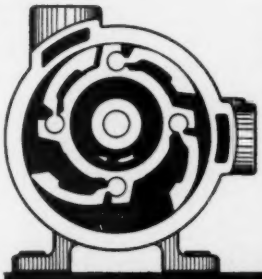
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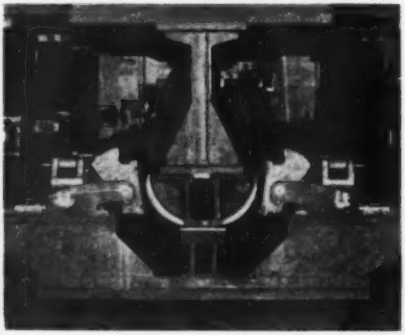
Unusual Tool-Up Forms 36" Pipelines

Forty foot lengths of 26" to 36" line pipe are being formed in hydraulic presses by National Tube Company in their McKeesport, Penna., plant. Of particular interest is the fact that adjustable tooling, developed and manufactured by the Verson Allsteel Press Company, Chicago, is used for the first time in forming large diameter pipe.

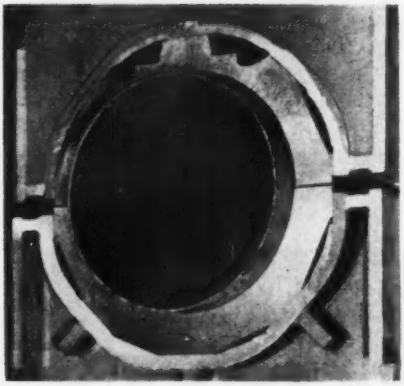
In the first operation a 2000 ton Verson hydraulic press is used to U-form

• • •

Close-up of the U-ing dies taken as the punch reached the bottom of its stroke completing the U-form. A short length of plate was used here for demonstration purposes.



Closing dies for the manufacture of large diameter line pipe.



2000 ton hydraulic press for U-forming steel plate in the manufacture of 40 foot lengths of large diameter pipe.

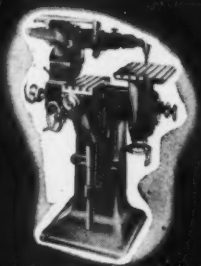


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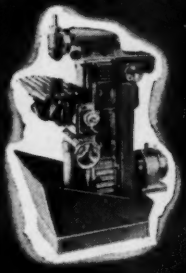
DECKEL MACHINE TOOLS universally recognized for Quality, Precise Production and Versatility. They can be used as single purpose machines for production or for multi-purpose operations in tool rooms and specialty plants.

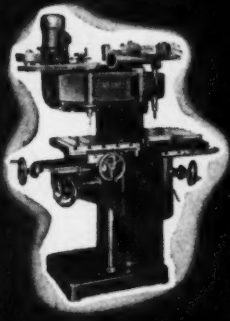
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FP 1 — UNIVERSAL MILLER (Horizontal and Vertical) for single jobs or production of tools, jigs, gauges, dies and molds. Micrometer measuring devices for jig boring. Attachments: Punch Milling, Spiral Milling, Vertical Milling Heads, Slotting Device, Fixed, Swivel or Circular Tables, Dividing Head.



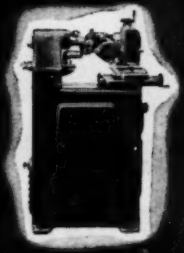


KF 1 — UNIVERSAL COPY MILLER for producing dies and molds up to 1100 lbs. With special accessories, the KF 1 provides greatest manufacturing economy. One handed 3 dimensional control. Ratio 1:1. Reduction and enlargement attachment has ratio from 1:1.5 to 1:7. Copy Table — 35½" sq. Max. work piece height 17". Optical tracing mechanism. Circular milling attachment.

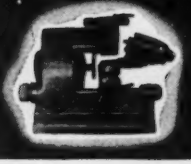


G 1 U — 2-DIMENSIONAL ENGRAVER for fine engraving and light milling. Ratios from 1:1 to 1:50. Light Pantograph with playless ball bearing joints provides easy guidance and accurate work.

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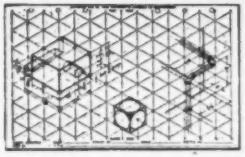


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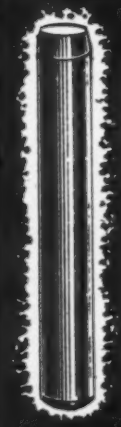


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the 40 foot steel plates, which range in thickness from ¼" to ⅝". The same dies are used for all pipe sizes. Adjustments for size of pipe and thickness of plate are made without removing the tools from the press. In the U-ing operation a complete forming cycle takes only 38 seconds.

The closing dies for the second operation consist of a pair of master shoes with different inserts for each pipe size. Both the upper and lower dies are half round in shape.

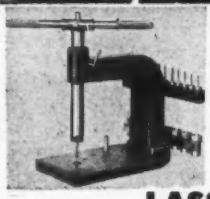
After the closing operation, the pipe is placed in a jig and butt welded. It is then put under hydrostatic pressure to expand and test.

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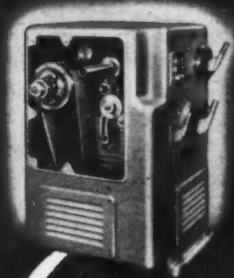
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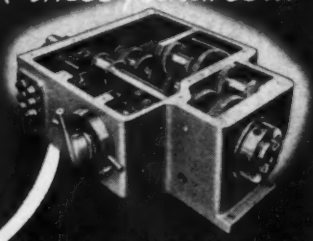
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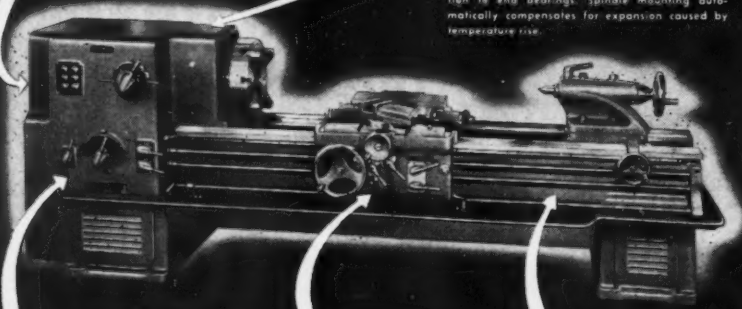
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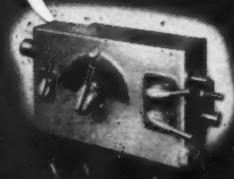


Change gears rotate on anti-friction bearings and are mounted on fixed centers. Driving sheave is mounted on pre-loaded anti-friction bearings and is full floating on sleeve bolted to back of headstock. Drive shaft deflection is thus eliminated.

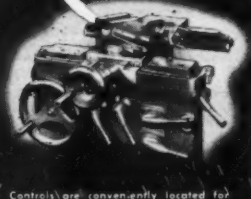


All herringbone geared headstock provides 32 pre-selective changes of spindle speeds through convenient dial control. Spindle and intermediate shafts are equipped with center bearings in addition to end bearings. Spindle mounting automatically compensates for expansion caused by temperature rise.





Sidney's totally enclosed dial controlled gear box provides 60 changes of threads and feeds. All moving parts run constantly in oil.



Controls are conveniently located for comfortable operation. Off-set compound—extra large micrometer dials—thumb screw dial lock. Notice also the four swivel hold-down bolts for added rigidity.



Rigid four-wall bed construction with double cross girts spaced at 12" intervals. Casting is of semi-steel nickel mixture for close grain structure.

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Foremanship Forum

Job Instruction In Four Easy Steps

by Ed. Mottershead

Ten years ago, facing the urgent need to get industrial production into high gear, we found that our basic lacks were in plant capacity, in machines and machine tools. Today, while there is strong demand for more machines and machine tools, our most critical lack is developing in the supply of skilled manpower. Labor pirates are already operating in some areas, and the gradual tightening of governmental controls will in part be aimed at eliminating this practice.

In the face of this increasing shortage of skilled workers, some industries today are suffering an increasing rate of employee turnover, especially among people newly hired for less skilled jobs. The cost of such turnover, especially where workers are scarce, is terrific. Estimates of the cost of recruiting, hiring, and training a new worker during his probationary period range from as little as $300 to well over $1000 for highly skilled and scarce personnel. A company employing only 200 people with a turnover of 5 percent a month may well be losing $50,000 a year or more down this particular rat-hole.

The problem of breaking in the new worker and teaching him his job is by no means a new problem, although it is intensified today. Most useful at the time of his employment, is direct "job-training"—how to do his particular job quickly, correctly, and consistently. While job training has been improved throughout industry during the past decade, the old, reliable, and not-so-efficient methods are still largely used: **telling** and **showing.**

Both these methods have many adantages, and when used properly can get fairly good results. But both have their limitations, and a great deal of scrap and rework and many headaches can spring from improper instruction by telling or showing. There is the old story concerning the crew that was erecting a derrick on a construction job. The boss told the helper to slack off on a guy wire. What was really in the boss's mind was to equalize the strain on all guys. The man, following verbal instruction, loosened the shackle bolts completely, and the whole strain of the mast was put on that one guy—for a moment. The derrick fell—just one of thousands of cases of unfortunate results that do happen when **telling** is the only method of instruction.

Showing, the other old "stand-by" method of instruction, also has its weaknesses. Did you ever have an experienced bundle wrapper **show** you how to tie a package and break off the heavy twine? It looked easy, but I'll bet you almost cut your hand in two trying to break off the twine the first few times. I saw an expert **showing** a helper how to solder on sheet metal. It certainly looked easy, but when the helper tried it, everything went wrong; the sheet warped; the solder wouldn't stick.

Why isn't just **telling** a man good instruction? In the first place, we are most of us predominately eye-minded. Books, magazines, movies, street signs, traffic lights . . . a great deal of what we do in life is determined by what we SEE, and telling doesn't help us see it. Secondly, there is the very human tendency to say too much too fast. About all the human bain can absorb in one dose is 4 seconds of talk—about 12 or 15 words. Then the brain needs a few seconds to soak it in and understand it. The multiplicity of words is confusing. Then again,

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many words do not have precise and specific meanings. Cam, curl, shoulder, ear, bushing, and many other words have a hundred different applications and meanings in industry. And then, in many cases, the technical words used on a particular job are commonplace to the experienced worker, but so much gobbledygook to the learner—a fact which is often overlooked by the leadman or supervisor doing the training.

Showing a man has certain definite **weaknesses** also. In the first place, it is difficult to be certain all the angles of the operation are observed. Much of the time a helper spends observing the skilled operator perform a job is wasted simply because the motions are too fast and the helper is not standing at the proper angle or position to really see what happens. Many times this is even carried to the extreme of seeing a thing backwards and doing it in reverse later on. Most jobs have knacks or key points which are difficult to show and need explanation. Finally, the learner will frequently **copy** motion without understanding it.

If there is enough telling and it is combined with sufficient showing, with the learner in the proper position to observe

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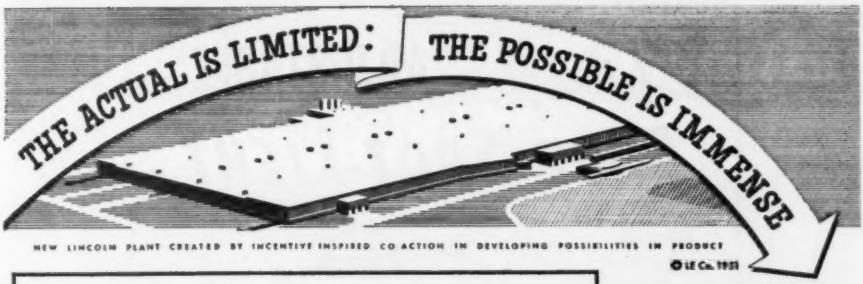
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correctly, you have the beginning of correct and efficient instruction techniques, but not the whole story.

Suppose you are about to instruct a worker how to do a particular job. Perhaps he is a new man; possibly he has been transferred into your department; perhaps he has been working under you for years and is about to start a new and more highly skilled operation. Can you remember how you felt on your first day on a new job? Can you remember the times you were unable to get the hang of it, the times you produced scrap, the times you got hurt through ignorance or carelessness, the times when some other worker helped you and coached you along The worker you are about to instruct feels the same way. He wants to make good. For your part, you are interested primarily in four things:

1. Having him come up to the quality and quantity of production desired as quickly as possible.
2. Avoiding accidents which might injure the worker.
3. Avoiding damage to the machine.
4. Avoiding scrap or rework as much as possible.

If you have broken down the job into its steps and keypoints so you know what to teach, have the workplace arranged and



NEW LINCOLN PLANT CREATED BY INCENTIVE INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

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MANUFACTURER CUTS TOOLING COST $800.00

BY simple redesign to welded steel, substantial savings are being effected in the production of these bearing housings. At the same time, product strength and rigidity have been increased to assure maximum serviceability . . . long-lived operation. An initial saving of $800.00 on setup and tooling expense results from the elimination of drill jigs and boring fixtures as well as for patterns and core boxes required with the original construction.

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Present Design *of bearing housing at Oliver Corporation, Springfield, Ohio, has 3" heavy wall pipe and plain formed legs. Requires but single pass weld. Costs $1.12 less than original construction.*

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the ACTUAL



Original Cast Construction *of bearing housing required fixtures for extensive boring and drilling operations.*

increasing the YIELD



First Changeover *to welded steel design has 90° formed legs welded to thin wall tubing. Was welded top and bottom as shown.*

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Each arm is equipped with horizontal and vertical swivels for 100% flexibility.

Shop lights come in a complete range of sizes and can be purchased with various types of mountings.

All models have Underwriters approved cords, plugs and sockets. Each model is finished in grey baked enamel and comes complete with green parabola shade.

The No. 2000-1 shop light is one of our most popular models. This light can be mounted on either horizontal or vertical surfaces. Available in 24", 30", and 44" lengths.

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Quantities of 6 @ $5.95 ea.
Single Units @ $7.95 ea.
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Manufactured by
Chicago DIE CASTING MFG. CO.
2515-17 West Monroe Street
Chicago 12, Illinois

all tools and materials ready, you are prepared to instruct. Here comes the worker, ready to learn. Try instructing him with the 4-step method outlined in this typical demonstration:

THIS IS WHAT HAPPENS:

FOREMAN JONES: Hello. Are you looking for me?
WORKER: I guess so. Are you the foreman here?

Step One: Prepare the worker to receive instruction.

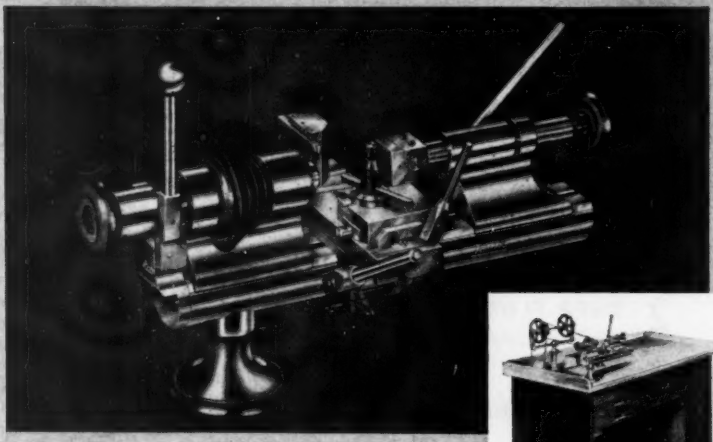
JONES: Yes. My name is Jones, Tom Jones. What's yours?
WORKER: I'm Jack Oliver. The personnel office sent me down here with this card and said you wanted a man for assembly work.

A. Put the worker AT EASE.
The learner can't think straight if you make him scared or embarrassed.

JONES: That's right. (Takes card.) So your name is Oliver? I suppose they call you Jack? (nod) That suit you? You call me Tom, everybody does. Besides, there's lots of Joneses alive, but I'm the

HOLD A ROD .004" IN DIAMETER

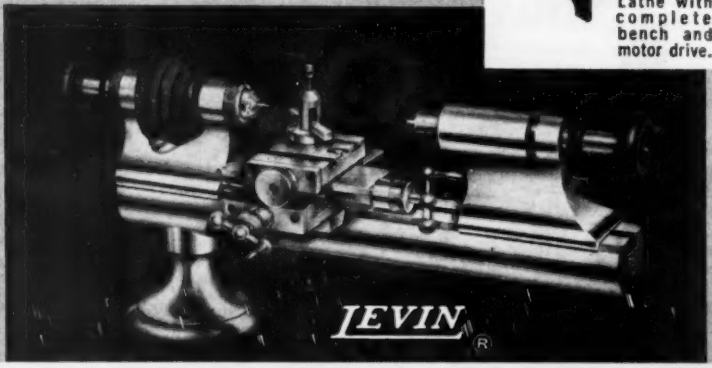
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only Tom in the department.
OLIVER: O.K. Mr. . . . er . . . Tom.
JONES: (looks at card) So you just got out of Lane Tech? Did you learn all about wiring and electricity there?
OLIVER: Well, I took the technical course, but there's probably a good deal I have to learn.

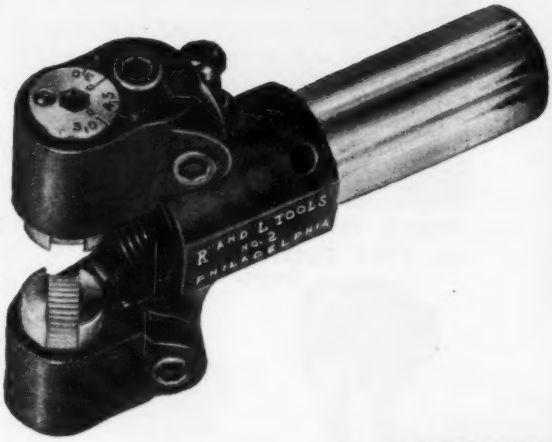
B. Find out just WHAT HE KNOWS already about the job.

JONES: That's all right. I've been here for fourteen years now, and there is still plenty for me to learn too. But we have a job here that ought to be of some interest to you. Did you ever do any camping out?

C. Get him INTERESTED. Relate the new job to the final product. Show the use and value and importance of the product, etc.

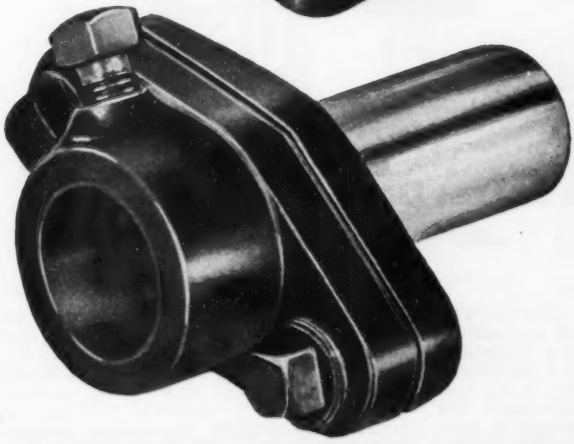
OLIVER: Sure. We go up to Canada every summer and spend a month or so in the wild part.
JONES: That sounds like a lot of fun. Did you ever have any use for flashlight on any of those trips?
OLIVER: Plenty! We used them for everything from trailing to signalling.

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NEW! R and L KNURLING TOOL

New streamlined design has half the weight of existing tools of comparable size, affords better grip and controls of knurls. Available in a complete range of sizes. Only one Hex Wrench needed for all adjustments.



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JONES: Well, this job we have for you here as a starter is that of assembling a special type of belt-hung flashlight that is a part of the standard equipment for our new tank corps. You have had enough experience to understand the importance of having a flashlight in perfect working order, and you can see the usefulness of it to the boys who are rolling those heavy tanks around.

OLIVER: Sure!

JONES: You'll find that this is a very simple job. It is no more complicated than putting together any other flashlight, and you should have no particular difficulty with it. But, this is a war order, and we have to get the goods out fast. So we have developed a **definite method** of putting these parts together to accomplish it **correctly** and yet as **quickly** as possible. I'm going to show you that special method, and you'll find as you use it, that you can turn out more work and be less tired at night than by working any other way.

OLIVER: I understand

JONES: By the way, are you right handed or left handed?

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OLIVER: Right handed.
JONES: Fine. Now, if you'll just stand over here where you can see what goes on, I'll explain this operation to you. (Moves worker to proper position.)

D. Put him in the RIGHT POSITION to see. Don't have him watch backwards or from any other angle than that from which he will see the job when he works.

JONES: (Picks up completed light.) Here is the completed flashlight. You can see that the lens is special ground, extra fine work, the housing for the lens and reflector is so made that it gives out a very strong and narrow beam of light. These clips on the back of the square case are for hanging it to your belt. And you can see that the square flat bottom makes it easy to set it down and throw the light exactly where you want it. (Demonstrates as he talks.) Now let's take

Step Two: PRESENT the operation. A. First time through, tell, show, illustrate, explain, each step carefully, In small doses'; 4 seconds of talk at a time.

this one apart so we can see what makes it work. First get the names of the parts

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straight so we both know what we are talking about. (Starts to take flashlight apart, naming each piece as he does so.

Bring out KEY POINTS
Ask question at each step and each key point to be sure learner understands.
Aim for accuracy now, speed later on.

With each piece, questions Oliver as to what it is and what it is for to be sure he knows names and understands the thing.)

JONES: Now just to make sure you've got all that, what do we call all these pieces?

OLIVER: Well, that's the cap, (pointing to each) and the back, and the case, the bottom, batteries, and the switch, the lens, the lens housing, the reflector, the reflector spring, and the bulb.

JONES: Fine, I think you have that down very well. Now this case will come

B. Repeat and Question, on each step as you go and as a final check-up

to you subassembled as you see it here, with the bulb already inserted. The bulbs have been tested and should work when you have it all put together. In front of you on the bench here you have these



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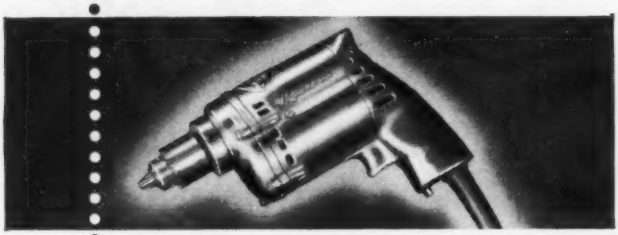
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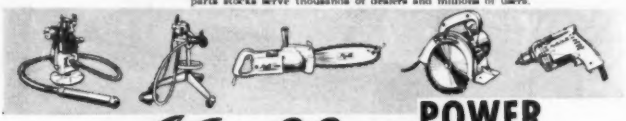
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chutes which come down from the part bins overhead. The stock boy will keep them filled up for you, and if you begin to run low on anything you can tell him, and he'll bring them to you. You see here in front of each chute a little pile of parts. All you have to do is to pull those parts further towards you and more will roll down the chute; so you always have plenty easily within reach.

Question every point as you go . . .

Now, how do you get the parts to work with?

OLIVER: The case comes in subassembled with the bulb in it. The parts come down the chutes from the bins overhead. The stockboy keeps the bins filled.

JONES: O.K. Now the first thing you do is pick up the case in your right hand and grab two batteries with your left.

Step One: Insert Batteries

You can see on the inside of the case this diagram which shows which way to put the batteries in. However, for speed, you can't be bothered looking each time; so when you pick up the two batteries, hold them by the ends, the one top fac-

TAPPING MACHINES

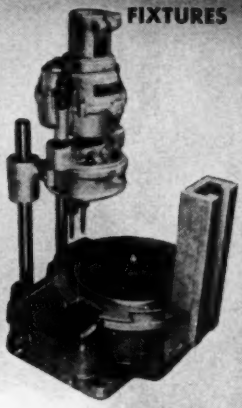


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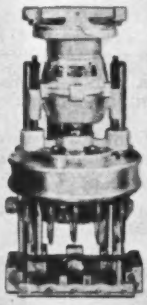
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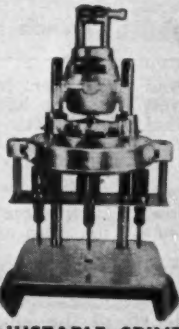
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MULTIPLE HEADS

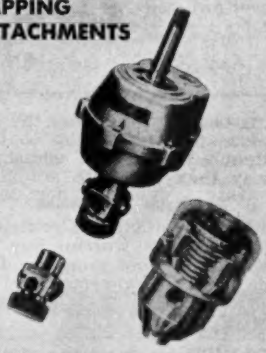


FIXED SPINDLE

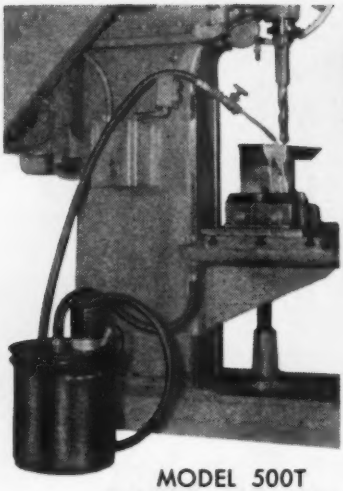


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ing one way, the other the opposite. And place the one on top so that your **left thumb** touches the contact point. That way they will both automatically be in

Key Point: Left thumb.

correct position and you can shove them in place fast without any bother. Now, what's the first thing we do? And what do you want to remember?

Check and question each step as you go . . .

OLIVER: Pick up the case in your right hand and two batteries in your left, with the battery contact points reversed, holding them by the ends, and remember to get the left thumb on the contact point of the one on top.

JONES: Right. Now the next thing is to pick up a back with your left hand,

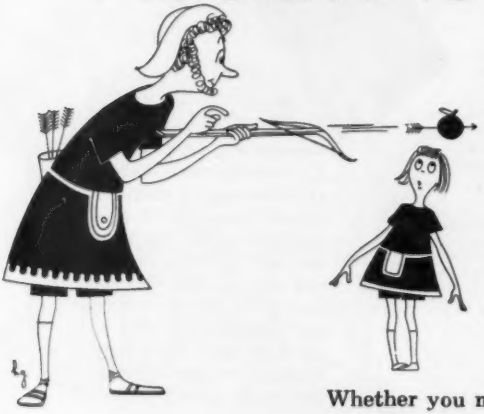
Step Two: Put on the back

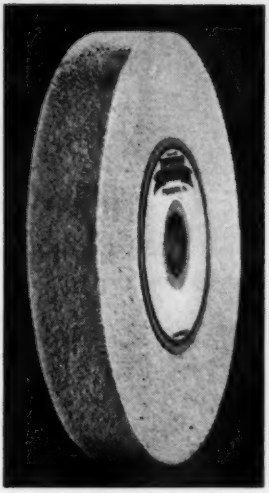
stick these little lugs into the slots on the case, and snap shut with your right thumb.

Key point: Lugs, snap shut.

(Jones goes on through the various steps of the job, bringing out the keypoints on each step, and stopping to question Oliver at each point as he goes along.)

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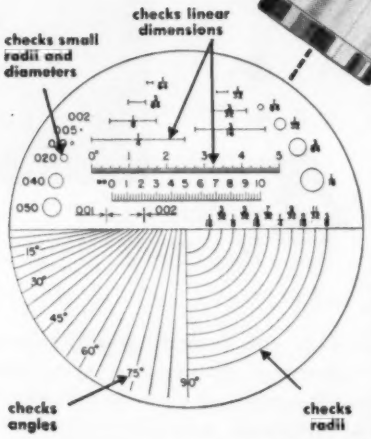
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JONES: Well, just to be sure we have everything under control, let's go through the thing again. I'll do the work, but this time you tell me what to do as we go. What's the first step?

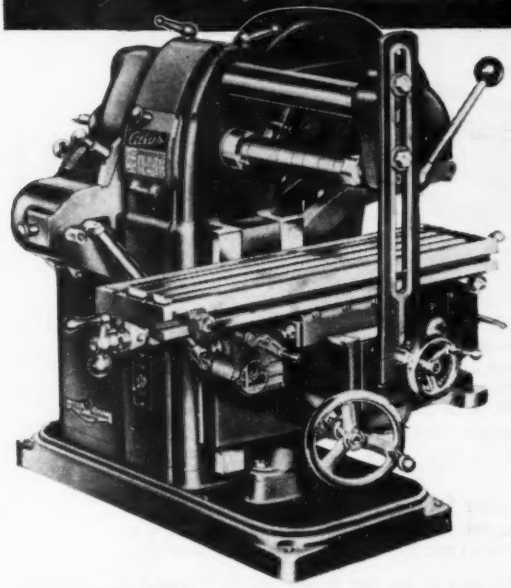
8. Repeat and question the whole thing. Have the learner do the talking. The teacher handles the tools and material.

OLIVER: Pick up the case in your right hand and two batteries in your left, one pointed each way, with your left thumb. . . . (Oliver goes ahead telling Jones what to do while Jones does the work. As they proceed, Jones continues to question Oliver, HOW . . . WHAT . . . WHY . . . WHEN . . . WHERE . . . WHICH questions which cannot be answered with yes or no, but require definite facts. This type of answer will prove whether Oliver actually knows and understands.)

It is essential on most jobs that the worker have a thorough understanding before he ever touches a tool or a piece of material: to avoid scrap, accidents, etc.

JONES: I think that now you have a very fine understanding of how this job

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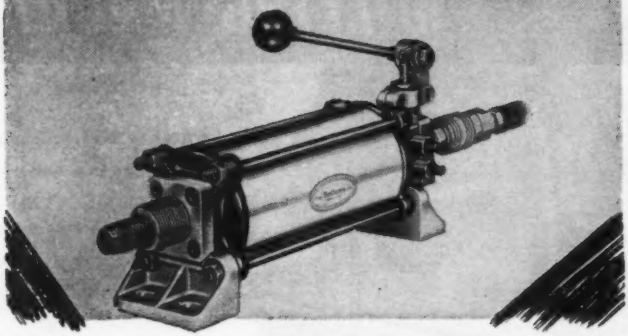
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is to be done. Now let's see you try a couple. Move over here by the bench just as you will be working.
(Oliver takes over and assembles a light.

Step Three: Have him PERFORM the job.
a. Correct errors.

Jones watches, says nothing so as not to bother the learner or make him nervous, but alert and ready to step in and correct

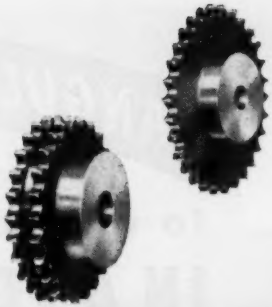
Repeat and correct any other errors
Coach on key points.
Repeat until perfect.

any error almost before it happens. This continues until Oliver does one or two perfectly to Jones' satisfaction.)
JONES: That's fine. You know, Jack, it is fairly easy for somebody like yourself with a natural mechanical ability to observe motions and pick up the knack of things. But just to be sure that you fully understand all of this as well as just remembering how to do it, I'd like you

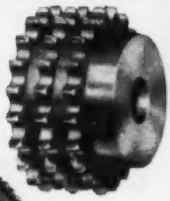
Continue this until YOU are SURE the worker KNOWS and can DO it.

to make one more, and as you do it, explain each step and show me the key points, just as though you were teaching it to me.
(Oliver assembles and explains.)

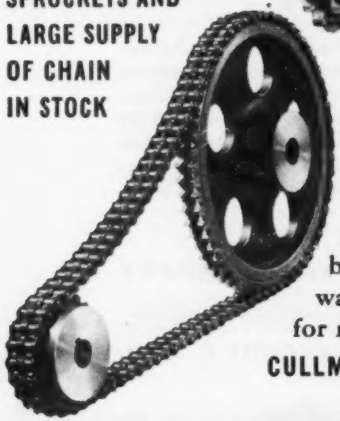
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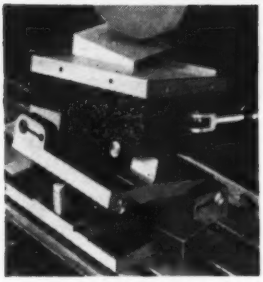
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JONES: You know, Jack, I think you're going to handle this job just fine. For the next couple of days you will be on a flat hourly rate, so take your time, get every one right, and just gradually build up your speed on those key motions. Then we'll put you on a piece

Step Four: Put the worker ON HIS OWN.

rate and you'll have a chance to make some pretty good money. And of course, keep in mind that this work leads to many other things. Now I'm going to leave you here, and you go right ahead turning them out. I'll be back in a little

A. Check frequently at first, gradually less.

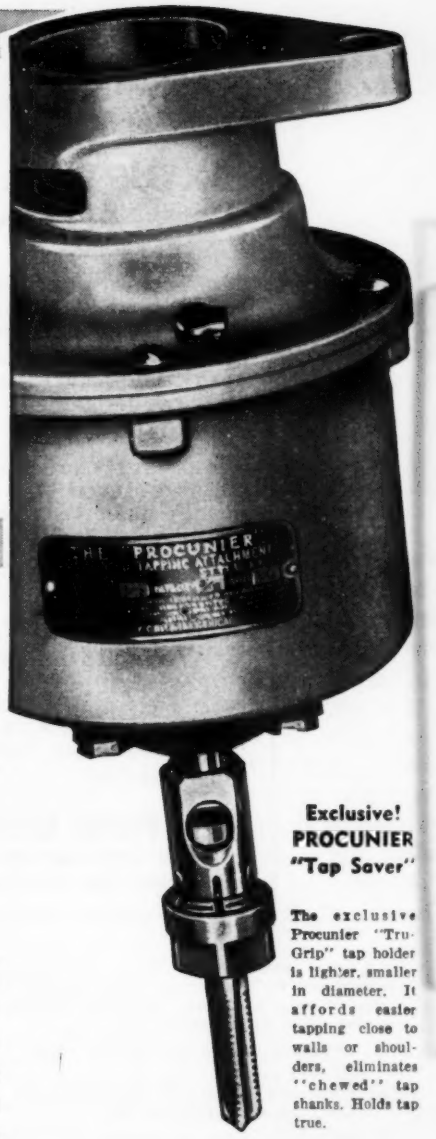
while to see how you are getting along, and answer any questions you may have. And remember, any time you have a question don't be afraid to ask. Don't

B. Tell Him definitely where to go for more information . . . and only ONE PERSON. Encourage him to ask questions.

ever think a question is too dumb. Most of these other fellows are on piece rate

FASTER precision TAPPING

with fewer "rejects!"



Procunier High Speed Tap Head shows consistently better performance. When you have to **produce**—and time is short . . . put Procunier High Speed Tapping equipment on the job and **watch production climb!** Here is the secret . . . here's why Procunier Tap Heads turn out precision tapping with fewer rejects, fewer broken taps: Tap driving pressure is **automatically regulated** by the amount of pressure applied to the unique Procunier clutch. An operator can quickly detect dull or "loaded" taps—by the pressure needed to drive them. Blind tapping is done as easily as through tapping! Improved features include: heat-treated gear mechanism for long, trouble-free life; ball bearings for lifetime accuracy; simple, one-hole lubrication system . . . as well as many others.

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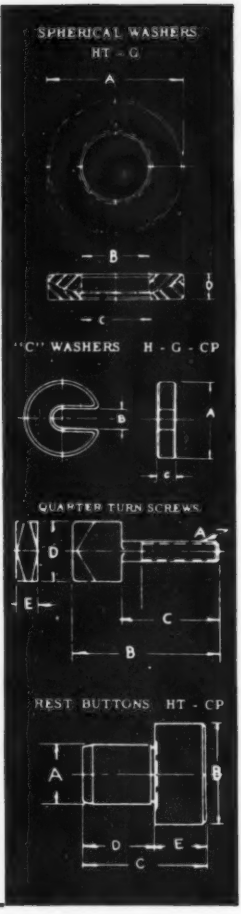
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too, and are pretty busy, and would rather not be bothered. I have plenty of time to help you, and I want you to come to me with your questions.

Introduce him to one or two other workers . . .
Take care of his information as to lunch room, washrooms, etc.

(Jones introduces a couple of other workers, and leaves with a final word of encouragement.)

Does this RIGHT METHOD get results? The average of all firms who have applied it to their training problems indicates that usually it cuts the training time in half . . . and avoids untold scrap and rework. Use this plan. Use it, or whatever part of it applies every time you want to put over some new idea, a new skill, a new operation to a worker, either an experienced worker or a new employee. Use it when you check a man's work when you make suggestions for his improvement. Use it at every opportunity, and remember that there is nothing in it for idle theory: every step and principle has been tested in practice for over forty years by leading plants in every industry.

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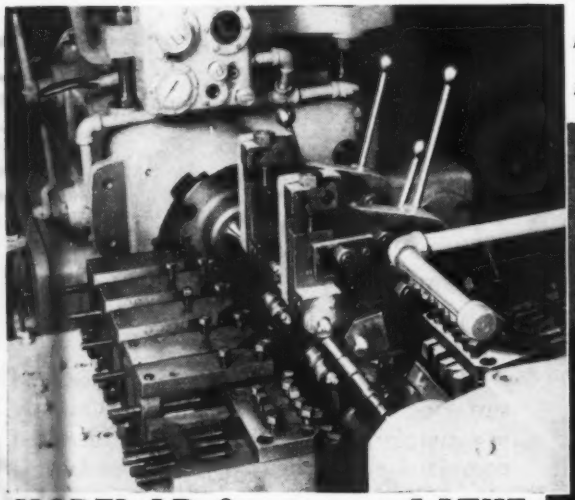
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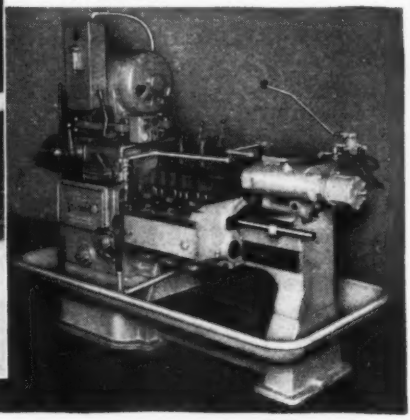
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



Left: Closeup view of tooling and steady rests.

Below: Model LR Lo-swing Lathe equipped for machining spinning rolls.



MODEL LR *Lo-swing* LATHE SPEEDS SPINNING ROLL PRODUCTION

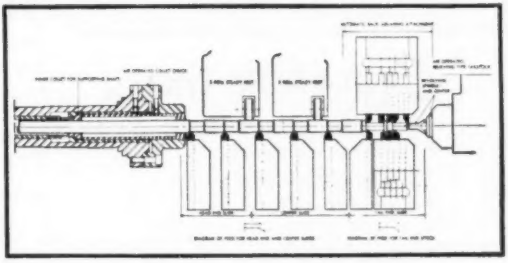
Problem: To turn and face long spinning rolls within close tolerances.

Solution: The Model LR Automatic Lo-swing Lathe selected for this job was equipped with a hollow spindle to permit one-half of the spinning roll to extend into the spindle. This method increased the rigidity of the work and assured closer machining tolerances. The upper right illustration shows the lathe equipped for the first turning operation. Note the relieving type tailstock which swings on hinged joints to facilitate loading work into the collet chuck. The upper left illustration is a closeup view of the tooling and steady rests.

The spinning rolls are turned from ground stock, properly centered on each end. They are supported by the collet chuck, two 3-roll rests, and a tailstock center, as shown in the tooling layout below. This method holds the work very rigidly and assures the close tolerances specified on the turned diameters.

The entire operation is automatic; the operator simply places the roll in position and locks the steady rests on the previously ground bar stock. The machine cycle is then started and continues automatically until all diameters are turned and faced, and the tool slides returned to the starting position. A similar machine and tooling is used for machining the opposite end of the shaft.

Let Seneca Falls engineers assist you with your turning problems.



SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

Cavitation Effect Minimized with New Davis Pump Booster

Practically any geared or vane type pump has a critical speed, above which the theoretical output of the pump exceeds the ability of the intake to supply the necessary liquid. When this speed is exceeded, cavitation—formation of partial vacuums or 'pockets' within the pump—occurs.

This cavitation effect causes a drop in output pressure, surges in the flow, pump noise, and impeller or gear and bearing wear.

The new Davis Booster, made by Francis W. Davis, 124 Lexington St., Waltham, Mass., by use of a simple venturi to automatically accelerate the input flow at high speeds, assures a steady input of solid fluid to the impeller. It also eliminates efficiency loss due to entrained air.

Designers of pump installations usually run up against the cavitation problem in applications where the pump has to run at widely varying speeds, such as in aircraft or automotive installations. If the pump is geared high enough to supply the desired pressure and volume at low speeds, its output drops in the higher speed range.

Basically the Davis Booster greatly increases the range of speed at which pumps can operate at or near peak efficiency. This means that in some cases smaller pumps, operating at higher top speeds can be used rather than large pumps. In other cases, the efficient speed range of a given pump can be extended to permit effective operation at higher driven speeds.

A typical problem solved by the Davis Booster was a geared pump installation for a power steering mechanism for automobiles. In order to supply the required minimum pressure at

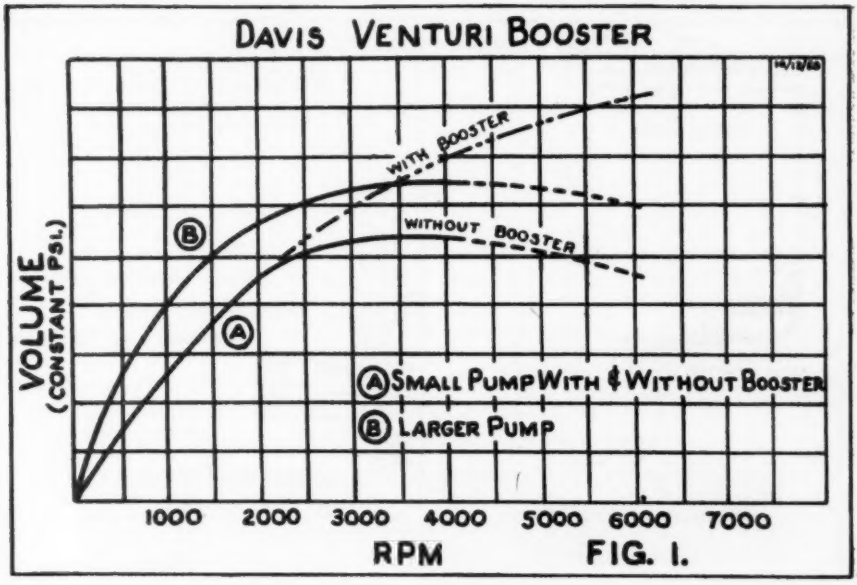


FIG. I.

engine idling speed (about 500 rpm) the original pump had to be quite large. But the large pump provided much more volume than necessary at low speeds; and pressure could not be maintained due to cavitation at high engine speeds (about 3500 rpm) such as in low-gear operation of the car. Pump noise was very objectionable and pressure surges made the operation of the power steering mechanism erratic.

The problem was neatly solved by use of a smaller pump plus a Davis Booster. To obtain the desired minimum pressure and volume at low engine speeds, the smaller pump was geared to operate at twice engine speed. The Booster stretched the pump's efficient operating range to such an extent that cavitation had not begun at the engine's top operating speed. Comparative performance of the two pumps is illustrated in figure 1.

The Davis Booster, figure 2, contains no moving parts. Its operation is dependent upon the difference in pressure between the static head and velocity head in a venturi device. Fluid flowing through the restricting nozzle furnishes the velocity head which would normally be below atmospheric pressure when entering the intake side of the pump. Connection is made at this point to a supply and make-up tank vented to the atmosphere. Consequently, the fluid in the throat of the venturi is raised to atmospheric pressure, thereby creating a "boost" or super-charge at the intake side of the pump. By assuring that atmospheric pressure is substantially maintained as the fluid enters the pump, the partial vacuum condition causing cavitation is prevented. Air entrained in the oil is bled out of the system through the vent in the supply tank during periods when the pump is stopped.

The Booster mechanism may either be added as an accessory or built into the pump. In either case, it is claimed, the possible reduction in pump size means an overall cost reduction due to the relatively low cost of the Booster.

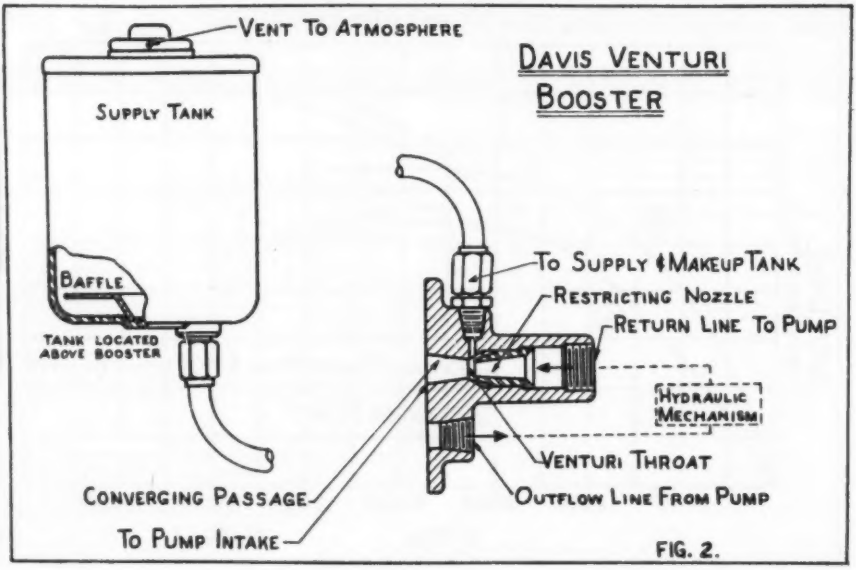


FIG. 2.

PERFECT HOLES



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- A NEW MACHINING METHOD! ROTARY BROACHING *
- A NEW NAME-"**ROTARY BROACH**" *

ROTARY BROACHES may be used in lathes, turret lathes, automatics, drill presses, etc., to replace reamers. They produce perfect holes with finishes that can only be compared to honing. They last longer before grinding is necessary and may be resharpened 10 to 30 times. They produce perfect holes at a fraction of the cost of those produced by other methods. Eliminates grinding, lapping, honing and boring.

USE THIS NEW MACHINING METHOD—ROTARY BROACHING*

You Cannot Afford Not To Use Rotary Broaches (Write for free descriptive literature)

*** "Rotary Broach" and "Rotary Broaching" are new names coined and copyrighted by Shearcut Tool Company.**

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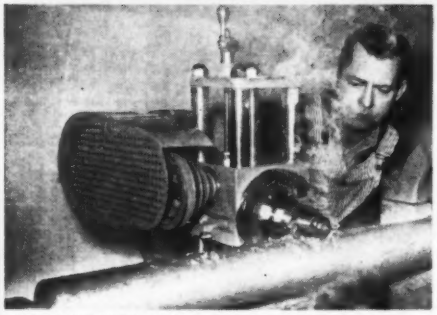
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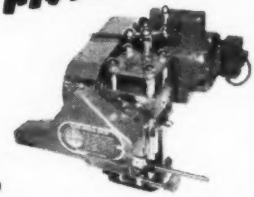
MODELS–FEATURES



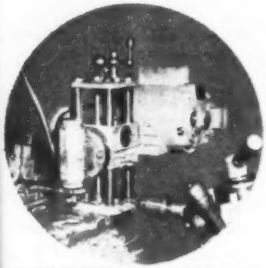
MILLING ON LATHE – Model "M" 1½ h. p. milling ½" keyway one foot per minute.

ON LATHES TURRETS AND MILLING MACHINES

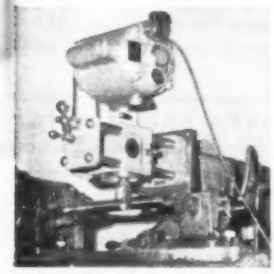
MM MACHINE TOOLS



Master Universal Slotting and Keyseating Head



MILLING ON TURRET – Model "B" with 90° milling head mounted on rear cross-slide for keyways, slots, cross milling – completing part in turret.



ON MILL – One or two milling heads can be used on post assembly for single or multiple milling cuts. Mounts on overarm for vertical milling or cross-ways for opposed milling head.

3 SIZES • CAPACITIES

Model "C" – ½ h. p. motor – 9" to 13" swing lathes
Model "B" – ½ or ¾ h. p. motor – 14" to 18" swing lathes
Model "M" – 1 or 1½ h. p. motor – 18" to 72" swing lathes

The Master Lathe Converter is a precision multi-purpose machine tool attachment adaptable on most all basic shop machines. The basic unit does milling, drilling, boring, and has eight interchangeable heads for milling, drilling, grinding, slotting, keyseating, and indexing. Spindle speeds, 50 to 15,000 rpm. It provides complete machining facilities with minimum equipment investment, produces more operations per set-up thus increasing production of your present equipment, saves work transfer, assures accuracy, is simple and fast to set up. Prime and subcontractors are converting their present equipment for special applications and production with the multi-purpose Master Lathe Converter.

COMPLETE SHOP KIT – **This group of equipment includes basic milling unit, external and internal grinding heads, 90° universal and hi-speed milling heads, slotting or internal keyseating head, 40 to 1 geared dividing head, seven arbors, in a heavy plywood shop cabinet. This kit provides facilities for most all machine shop operations on a lathe at a fraction of the investment required for individual machines, plus wide use on other basic shop machines. Ideal for maintenance and repair, tool room, experimental, mobile units, aboard ships, and production shops.**



★ MILLING ★ DRILLING ★ BORING
★ THREAD MILLING ★ GRINDING
★ SLOTTING ★ INDEXING
★ INTERNAL KEYSEATING

WRITE FOR FREE LITERATURE

MASTER MANUFACTURING CO.
1310 EAST AVENUE A
HUTCHINSON, KANSAS, U. S. A.



MTBB
MARCH 1951

Available Literature

1. Convertical Mill Attachment for vertical-angular and compound angle work on horizontal mills features full use of table travel, rapid settings, and easy speed change. 4-page folder available from **Rusnok Tool Works, 4840 W. North Ave., Chicago 39, Ill.**

2. Plain and Universal Milling Machines, 10 h.p. Model No. CK, are discussed and illustrated in bulletin CK-10. Performs with greater rigidity, cutting efficiency, and smoother feed performance. Mono-Lever control facility affords greater operating convenience. **Kearney Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.**

3. Upright Drill, No. 2-12, infinite speeds, ball bearing equipped, 1″ drill capacity, 9 geared feeds, 24″ swing, is described fully in 11-page catalog 4915. **Western Machine Tool Works, Holland, Mich.**

4. Flexible Shaft Machine, 900 series, 1/15 h.p. excellent for internal carving of plastics, features universal motor with forced draft air-cooling provisions, and choice of 5 handpiece types. Folder 79 available from **Foredom Electric Co., 27 Park Pl., New York 7, N. Y.**

5. Pallet Lift Truck for double-face pallets has standard 4″ lift with capacity 4000 and 6000 lbs. Bulletin 22 gives complete specifications and actual applications. Available from **Lyon-Raymond Corp., 21178 Madison St., Greene, N. Y.**

6. Universal Joint catalog C1 is full of data as to purchase, design, production, and maintenance of universal joints. Includes dynomometer tests, graphs on static torque tests and frictional heat loss curves. **Curtis Universal Joint Co., 4 Birnie Ave., Springfield 7, Mass.**

7. Precision Levels, made in two standard sizes, and also in special types in graduations in degrees or thousandths for permanent mounting, are discussed in recent 4-page bulletin. **Wm. B. Fell Co., 320 McLain Ave., Rockford, Ill.**

8. Luma Soldering Tools save time, solder, and kilowatt hours, also eliminates cold joints, stray currents, and burned insulation. 10-page catalog No. 19 available from **Luma Electric Equipment Co., P. O. Box 132-H, Toledo 1, O.**

9. Molded Plastics Service. Folder describes this service and also illustrates a few cost examples. Some of the properties used are polyethylene, nylon, and tenite I. **Dayton Rogers Mfg. Co., Minneapolis 7, Minn.**

10. Circular Bending Machine, No. 14-R, for bending of angles, flats, pipes, rounds, squares, tees, channels, has push button controls for forward, reverse, and inching movement. Circular No. 14-R may be had by writing **Excelsior Tool & Machine Co., E. St. Louis, Ill.**

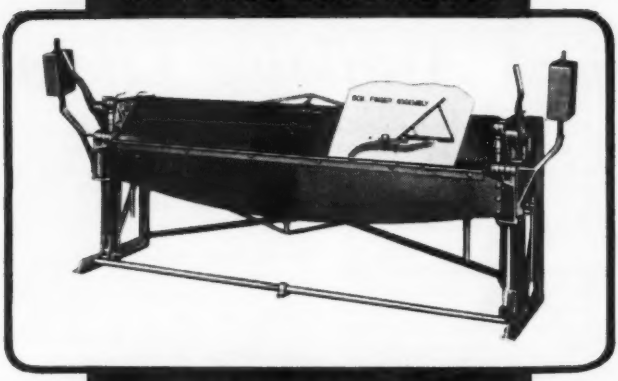
11. "An Easy Guide to Proper Marking" illustrates and describes various methods and equipment used in marking products of all types and sizes. 4-page bulletin LI-M published by **Jas. H. Matthews & Co., 3946 Forbes St., Pittsburgh 13, Pa.**

12. Steel Shelving, 100% adjustable from front of unit, saves 60% in assembly time. 8-page bulletin describes various shelving, parts, bins, steel counters, benches, and steel drawers. **Equipto Div. of Aurora Equipment Co., Aurora, Ill.**

13. Modern Dry (Gas) Cyaniding Process is described in 4-page bulletin SC-145. Liquid quenching and slow cooling and their applications are discussed. Modern equipment and typical installations are shown. **Surface Combustion Corp., Toledo 1, Ohio.**

14. Speed Reducers and Gear Sets, ranging between 5:1 and 70:1 ratio, and from .05 up to 555 hp capacity, are discussed in 4-page bulletin 789-50. Data on ratios, center distances, and horsepower capacities. **Cone-Drive Gears, Div. of Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.**

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TOOL COMPANY
41 YEARS EXPERIENCE



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ROLLER BEARING
BENDING BRAKES

A modern departure from conventional hand brake design. Work is not limited to straight bending and box and pan work alone. Special attachments permit many intricate forming operations. Made in 16, 14, 12 gauge capacities; 4, 5, 6, 8, and 10-foot sizes.

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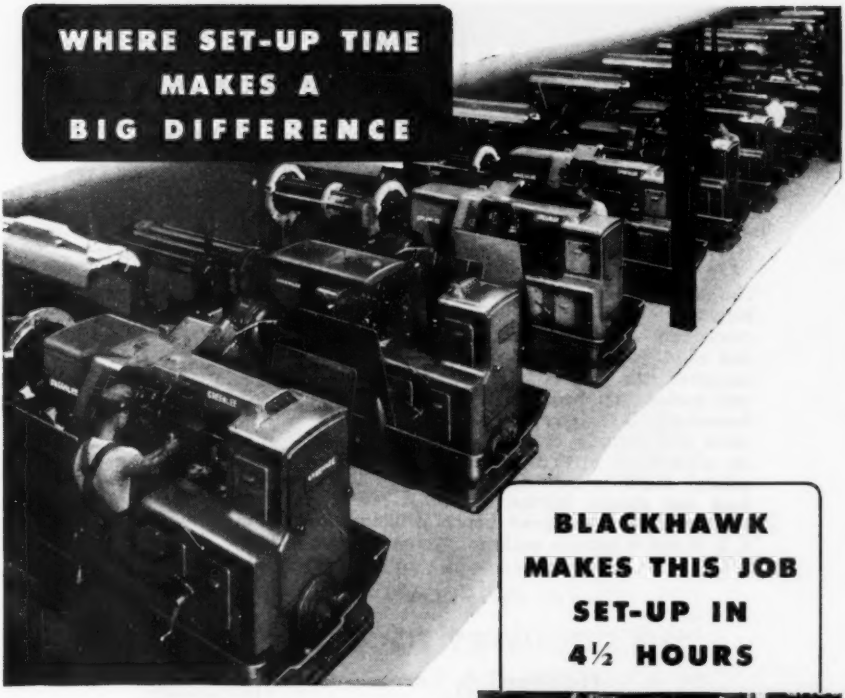
15. Drillheads, gear driven and full ball bearing universal joint types, are described in a 4-page folder. Data includes capacities from No. 60 to 1½″ steel, range of adjustment from 1″ to 14.2″, overall dimensions, weights, maximum speeds. **Thriftmaster Products Corp., 1004 N. Plum St., Lancaster, Pa.**

16. "Hydraulic Fundamentals and Industrial Hydraulic Oils", 44-page technical bulletin B-4, gives information on hydraulic systems, maintenance, trouble-shooting, and selection of proper fluids. Includes cutaway drawings of basic types of valves, pumps, hydraulic motors, torque converters, etc. **Sun Oil Co., Philadelphia 3, Pa.**

17. B & S Micrometers feature carbide measuring faces, larger diameter thimble, black graduations, rust resistant, stainless steel one-piece spindle, etc. 11-page booklet gives specifications and prices. **Brown & Sharpe Mfg. Co., Providence 1, R. I.**

18. Flamatic Catalog, 20-pages, on No. 2 flamatic hardening machine features twelve application case histories illustrated with operation photographs and

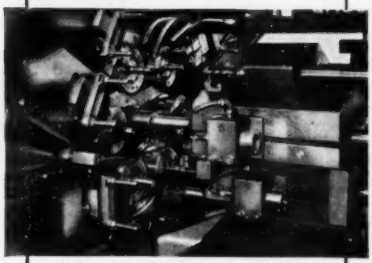
WHERE SET-UP TIME MAKES A BIG DIFFERENCE



BLACKHAWK MAKES THIS JOB SET-UP IN 4½ HOURS

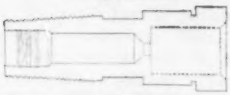
To be profitably accomplished, small-lot production on multiple-spindle screw machines requires a minimum of set-up time. Greenlee Automatics were especially designed for rapid machine changes to accommodate small-lot work.

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SET-UP FOR "SPEE-D"* COUPLER PART

*T. M. Reg. U. S. Pat. Off.



Twelve operations on this steel piece are performed in a cycle time of 21 seconds. Included are forming and shaving to close tolerances, facing, turning, and undercutting, accurate deep drilling, threading, and tapping. Set-up time is 4-1/2 hours. Only one tool change is needed on a 10,000 run.

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MAINTAINED ACCURACY

IN PRECISION WORK

The Sigourney M-100 Bench Drilling Machine is extremely accurate on precision jobs. It is unusually sturdy and rigid in construction . . . has hardened and ground spindles . . . and sealed ball bearings throughout. All moving parts are entirely closed for maximum operator safety. M-100 is built for long and steady service.

This sturdily constructed bench drilling machine is available in 1, 2, 3 and 4 spindle models . . . speeds from 4,000 to 10,000 r.p.m.

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Hartford 6, Conn.



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photo-micrographs. Free on request to **The Cincinnati Milling Machine Co., Flamatic Div., Cincinnati 9, O.**

19. Grinding Wheel Bond 79E for grinding wheels and mounted wheels saves 79 minutes of production time per day. 4-page folder outlines advantages and applications. **Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Dept. HB, Chicago 7, Ill.**

20. Cullman Grip-Master, interchangeable hubs for disc sprockets, can be interchanged and mounted without removing the hubs from the shaft. 4-page folder gives prices and specifications. **Cullman Wheel Co., 1350-W. Altgeld St., Chicago 14, Ill.**

21. Ernst Hardness Tester, portable, accurate for immediate direct readings, can test metal hardness of any shape, thickness, style, size and permits testing of repetitive or assembly line work. 4-page bulletin ET. **Newage International, Inc., 521 5th Ave., New York 17, N. Y.**

22. Longlife protects old or new masonry, inside or outside from exposure. Folder discusses where, when and how it should be applied. **Flexrock Co., 3634 Filbert St., Philadelphia 4, Pa.**



★ ***PRODUCTION INCREASED FROM 18 TO 31 PIECES PER HOUR*** machining pipe union from 18-8 stainless steel in single spindle automatic *after* changing over to Stuart's THREDKUT 99.

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D. A. Stuart Oil Co.

2749 S. Troy Street, Chicago 23, Ill.

23. Tool Specialties, some of which are precision vises, turret tool posts, Procunier tapping heads, lathe chucks, and expanding mandrels, are illustrated and described in a 12-page circular. All items are in demand; some are not too easy to obtain at the present. **Lafayette Tool & Supply Co., 128 Lafayette St., New York 13, N. Y.**

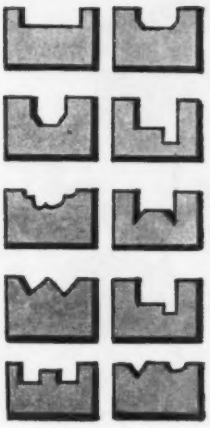
24. Hand-I-Hack, portable power hack saw, eliminates fatigue, cuts true, operates with draw cut and lift return, and works in any position. Descriptive folder available from **Lipe-Rollway Corp., 818 Emerson Ave., Syracuse 1, N. Y.**

25. Stock Oiler and Wiper cleans and lubricates the stock before ie enters the dies. Die life is prolonger and a minimum of oil is used. Circular available from **Durant Tool Supply Co., 155 Orange St., Providence 3, R.I.**

26. "Shield-Arc SAE" Welder provides high quality uniform welds, operates on less fuel, and is versatile for a wide range of work. Bulletin 1304 describing this welder may be secured from **The Lincoln Electric Co., Dept. 261, Cleveland 1, O.**

27. Hargrave Tested Tools including clamps, chisels, punches, file cleaners,

Newfield UNIVERSAL FLY CUTTER





Above: FACE MILLING

Above—a few of the many cuts that can be made with the Newfield Universal Fly Cutter in ONE *operation on a horizontal or vertical mill or drill press. Individually adjustable bit holders permit slots of any shape to be cut 3/16" to 2" wide.*

STANDARD BITS MAKE 4 TO 6 DIFFERENT CUTS IN 1 OPERATION!

For many types of milling, light metals and plastics as well as steel, there is no longer need for special cutters. A single Newfield Universal Fly Cutter, utilizing any type of standard high speed steel or carbide bits, makes multiple cuts in one operation. In contrast with expensive specially ground cutters, the standard bits used in the Newfield are easily and quickly ground in your own shop, readily replaced or reground for other work, at small cost. There is practically no down-time if a bit is broken.

The Newfield fits all standard arbors, turns to any required speed for fly cutting, slotting, surface and straddle milling, gear cutting, disc and gasket cutting. Standard sizes are 4", 6", 8", 10". Write for details of this versatile, production-upping, money-saving tool.

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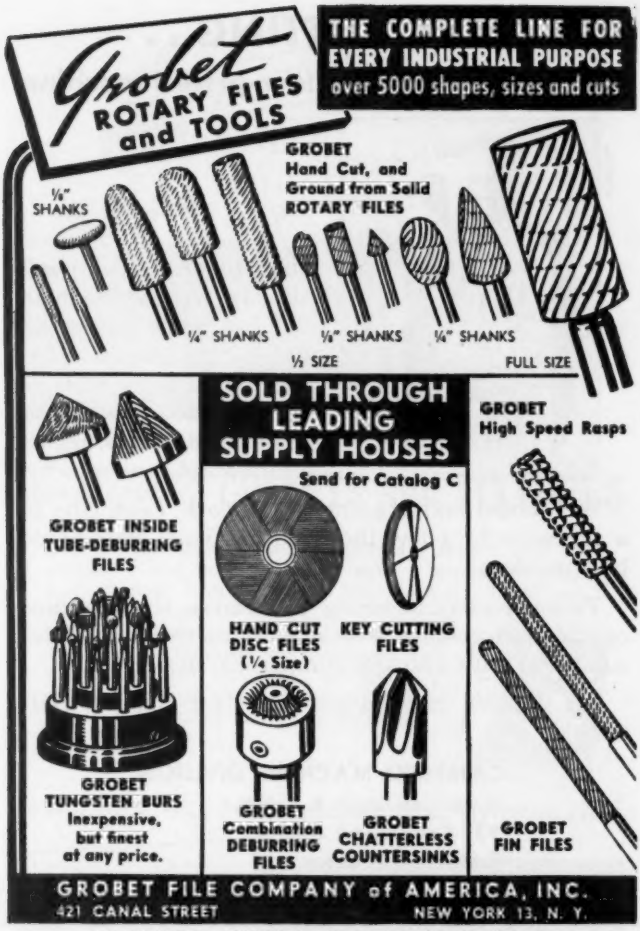
210 West Seventh St., Los Angeles 14, California

washer cutters, brace wrenches, etc. are illustrated and described in 39-page catalog 49. Specifications and prices are also given. **The Cincinnati Tool Co., 1945 Waverly, Cincinnati 12, O.**

28. Power Auger Bit can be operated at high speeds, drills accurately, has keen cutting edges, uniformly hardened, will bore hard and soft woods, fits ¼" chucks, and won't slip in chuck. Other features given in circular. **Whitman & Barnes, Div. of United Drill and Tool Corp., Plymouth, Mich.**

29. Rapistan Casters and Trucks, including steel forged casters, stamped steel casters, floor locks, platform trucks, wheels, etc., are discussed in a 36-page, 3-color catalog CT-50. Specifications and prices are given plus tips on the proper choice of models. **The Rapids-Standard Co., Inc., Grand Rapids 2, Mich.**

30. Keps, Fastening Units of pre-assembled nuts and lock washers, improve product performance, and provide definite production cost reduction. Pertinent data, as well as types and sizes, are given in a 15-page catalog. **Shakeproof, Inc., 2501 N. Keeler Ave., Chicago 39, Ill.**



31. Lifting Magnets, of all-welded steel, weighs less, lifts more, and is equipped with protector plate guards. 6-page catalog B-1401-A gives features, size ranges, lifting capacities, dimensions and ratings. Also includes cross-sectional drawing. **Dings Magnetic Separator Co., 4740 W. Electric Ave., Milwaukee 46, Wis.**

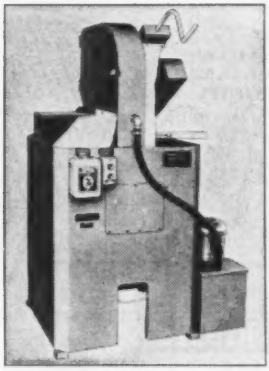
32. Impregnating Equipment bulletin B-30, 8 pages, contains data and illustrations covering impregnating cycle, tank closures, methods of heating, accessories, condenser, vacuum equipment, agitator for liquor tank, rupture discs, etc. **Struthers Wells Corp., Warren, Pa.**

33. X-Ray Thickness Gauge can provide a non-contact method of measuring cold-rolled steel strip thicknesses from 0.0050 to 0.1196 in. as it passes through cold mill operations. Booklet DB 404-100, 8-pages, gives basic theory of the gauge, block-diagramming its electrical circuits. **Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.**

34. Worm Gear Drives feature compact design, anti-friction bearings, automatic splash lubrication, high ratios in small space, quiet performance, etc. Drive problems and their solutions are included

ABRASIVE CUTTING . .

Wet or Dry with this low-priced machine



The Model 15 Campbell Abrasive Cutting Machine will cut solid bar stock and tubing economically. Material may be steel of any analysis—annealed or unannealed—brass, monel, ceramic or phenolic plastic.

Wet model makes extremely smooth, clean cuts to a tolerance of a few thousandths—with little or no burr or burn.

Through manufacturing economies, this machine can be produced and sold at an attractively low price compared with previous comparable models.

For detailed information, write for Bulletin DH-102-C.

CAMPBELL MACHINE DIVISION
American Chain & Cable
937 Connecticut Avenue
Bridgeport 2, Conn.

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in the 80-page Book No. 2324. **Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.**

35. "The ABC's of Welding High Tensile Steels" compares mild steel and low hydrogen electrodes, as related to preheating, underbead cracking, moisture in the arc and in the coating, burn-off rate, cost of operation, etc. 7-page booklet available from **Arcos Corp., 1500 So. 50th St., Philadelphia 43, Pa.**

36. Tumb-L-Matic, Tumb-L-Dur burnishing machines, for wet ball burnishing and polishing jewelry and small metal parts, has long life, does not warp, and can be fabricated into pocket tumblers for special applications, etc. Bulletin No. TDB-50. **Tumb-L-Matic, Lupomatic Industries, Inc., 4510 Bullard Ave., New York 66, N.Y.**

37. Method Process transforms hard carbides into accurate shapes. 2-page folder describing this process also gives advantages and limitations. **The Method X Co., American and Cayuga Sts., Phil. 40, Pa.**

38. Stitchers and Staplers, described in 4-page folder Ptg 229B, will do a better and faster job of box bottoming for all shippers from the smallest to the largest.



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Zagar COLLETS and FIXTURES

Cut tooling costs! Whether parts are round, hex or square, Zagar collet fixtures save a world of time and money, turning losses into profits. Ideal for second operation work, since collet does not move lengthwise. Collet closing mechanism consists of hardened and ground collet bushing actuated by cams through movement of hand lever. All sliding parts are hardened and ground.



Ask for Catalog MT-3

ZAGAR TOOL, INC., 24000 Lakeland Blvd., Cleveland 23, O.

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

Bostitch, 821 Mechanic St., Westerly, R.I.

39. Improved Plow Steel Wire Rope, presented in 4-page bulletin No. 50-25, is produced under rigid quality controls. Information is given on construction and how to order wire rope. **Macwhyte Co., Kenosha, Wis.**

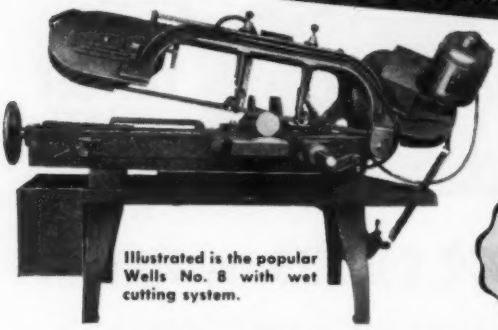
40. "Iron Hand", completely self-contained automatic unloader, removes sheet metal stampings from mechanical and hydraulic presses. Action photographs and detail drawings illustrate the operation cycle and special features in a 7-page booklet. **Sahlin Engineering Co., 267 Ferndale St., Birmingham, Mich.**

41. Industrial V-Belt catalog, 40-pages, contains do's and don'ts for better transmission efficiency and longer belt life. Also engineering data, drive selections, comparison charts and correction factors. **Industrial Sales Div., Durkee-Atwood Co., Minneapolis 13, Minn.**

42. Beaver Tools and Holders, some of which are quick change tool holders, solid carbide blade milling cutters, arbors, adaptors, milling and boring machine accessories, are illustrated together with specifications in 89-page catalog No. 49. **Beaver Tool and Engineering Corp., 2850 Rochester Rd., R. 1, Royal Oak, Mich.**

On cut-off jobs...
You benefit 4 ways with Wells Saws

1. Fast, continuous cutting action.
2. Greater accuracy on each job.
3. More pieces per length of stock.
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Illustrated is the popular Wells No. 8 with wet cutting system.

Our 25th Year of Service

HORIZONTAL band sawing is the modern, cost-cutting way to handle cut-off jobs . . . and Wells Saws are the leaders among horizontal metal cutting band saw machines. Simplicity of design means fewer moving parts and easy operation. Ruggedly built to increase productivity and reduce cutting costs, a Wells Saw pays for itself quickly and will give you years and years of dependable, satisfactory service.

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WELLS MANUFACTURING CORPORATION
707 COOLIDGE AVE., THREE RIVERS, MICH.

NEW BOOKS

The Cylinder Wear in Diesel Engines

By Carl Hoegh, Technical Director, Leif Hoegh & Co. Published by Chemical Publishing Co., Inc., Brooklyn, N.Y., 1949. 243 pages. $5.00.

Available data on the subject of cylinder wear in diesel engines is found in this book. A discussion is made of all factors affecting piston and cylinder wear and the proposals for reducing wear and increasing the efficiency of Diesel engines.

Some of the topics covered in this volume are piston rings, lubrication, fuel oils, ignition and combustion, deposits and abrasives, temperatures, corrosion, material and surface treatment, operating conditions, and types of engines.

Design for Welding

By Robert S. Green, M.S.E., Editor; Douglas C. Williams, Ph. D., and Charles B. Smith, B.C.E., Associate Editors. Published by The James F. Lincoln Arc Welding Foundation, Cleveland, O. Over 1000 pages. $2.00.

This book consists of abstracts of eighty-

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With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon–high chrome steels of any degree of hardness.

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Many of the studies describe the application of welding directed to reducing costs and improving the quality and performance.

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Industrial Inspection Methods

By Leno C. Michelon. Published by Harper & Brothers Publishers, New York, 1950, Revised Edition. 568 pages, $6.00.

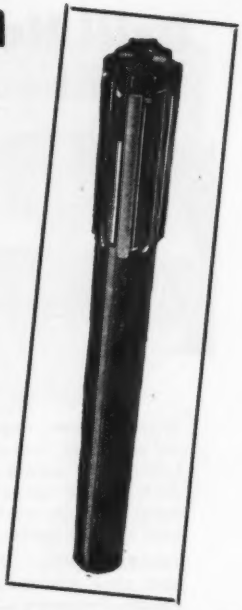
This complete revised edition presents precision measurement as it is today—its growth in techniques, standardization, new devices, and statistical methods.

Mr. Michelon is Assistant Professor of Industrial Management in the Technical

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The QUALITY Tools



FOR years, Staples Expansion and Solid Reamers and other carbide-tipped cutting tools have been known for their superior performance. You can specify Staples Tools with the assurance that their quality is never lowered to meet a price.

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If your requirements for *special tools* are slight alterations of standard tools, Staples can meet your special requirements and ship within several days.

Tell us your requirements. Send for complete tool catalog.

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio

Staples **Distributors in Major Cities**
CARBIDE-TIPPED CUTTING TOOLS

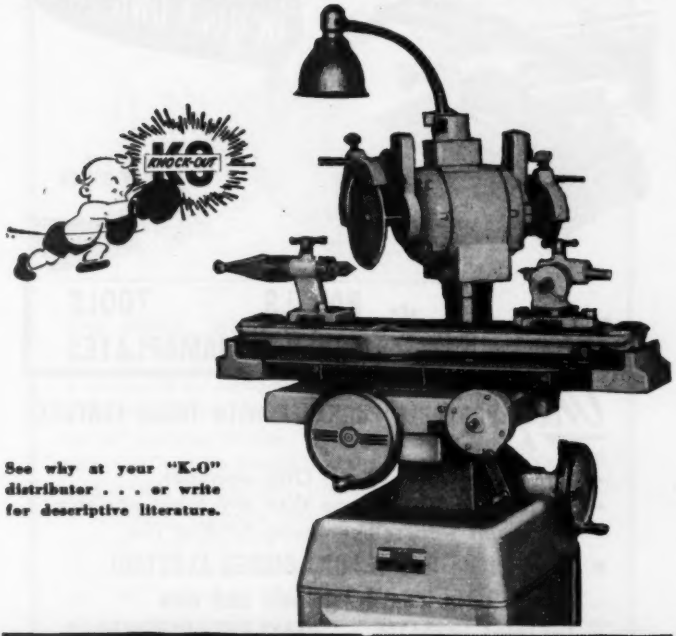
A COMPLETE LINE OF SINGLE AND MULTIPLE POINT CUTTING TOOLS
EXPANSION REAMERS — FORM TOOLS — CENTERS — MASONRY DRILLS
SPECIAL TOOLS

Institutes Division of Purdue University. During the war he was Head of Inspection Engineering for the Bureau of Aeronautics at Wright Field. Also he has had special technical training at a number of institutions.

The major divisions of the work are concerned with basis concepts, dimensional control, testing for physical and mechanical properties, surface inspection, and inspection organization and personnel. The various precision and non-precision tools used in inspection work are described fully and their correct use illustrated. Rules, micrometers, verniers, gages, dial indicators, comparators, optical measuring devices, automatic gages, etc. are fully covered. Extended treatment is given to statistical quality control methods, modern destructive and non-destructive tests for physical and mechanical porperties, modern techniques in surface measurement, and other similar topics.

More than 450 accurate reproduced illustrations are included in the text as well as pertinent tables and charts and a complete list of bibliographical and visual aids. Problems and questions for study are also provided for each chapter.

There's a reason . . . 85% of all popularly-priced Tool and Cutter Grinders sold are *"Knock-Outs"*



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How DoAll Gages Are Used

18 minutes running time. 35 mm. sound-slide film with record. Available from Clint H. Rosene, Director of Relations, The DoAll Company, Des Plaines, Ill.

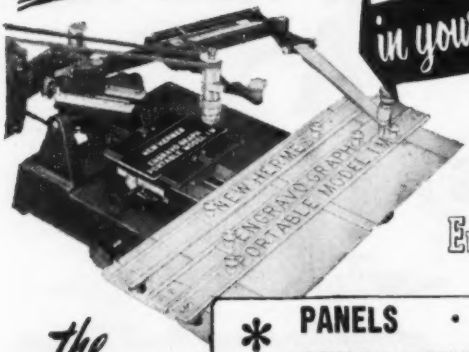
This interesting industrial film covers the methods of using laboratory, inspection and work gage blocks. Included are methods of inspecting a plug gage, a micrometer, parts such as universal joints, gears, etc. Also illustrated is the technique for checking the spacing of cutters and the dimensions of a casting. Graphically shown are the benefits of having an inspector constantly check accuracy throughout a manufacturing plant by the correct usage of modern precision inspection equipment.

Three for One

18 minutes running time. 16 mm. black and white, sound film. It is obtainable without charge from The Bullard Company, Bridgeport 2, Conn.

This industrial film tells in detail how the new Bullard Man-Au-Trol, Three Spindle Lathe, Model No. 30H, is set up and operated for either automatic or

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PORTABLE ENGRAVER described in Folder 1M-28
HEAVY DUTY ENGRAVER described in Folder H-28

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The world's largest manufacturer of portable engraving machines

manual production. Illustrated in graphic detail is the explanation of how the Man-Au-Trol controls the cutting tools through their automatic cycle. This film should be of particular interest to manufacturing plants generally, foremen's groups, metal shows, industrial and business societies, etc.

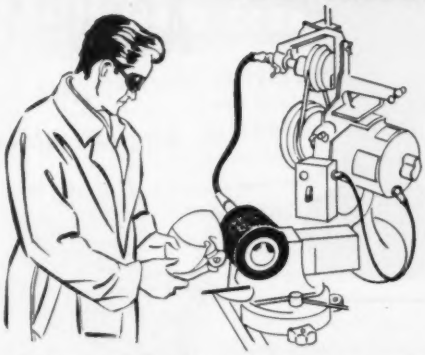
Motors on Parade

26 minutes running time. 16 mm. black and white, sound film. One reel. Available from Public Relations Department, Delco Products Division, General Motors Corporation, 329 E. First St., Dayton 1, Ohio.

This film serves the dual purpose of showing the importance of the contribution of the electric motor to the home, farm, transportation and industry, and to show how electric motors are manufactured on a production basis. It is aimed primarily at equipment manufacturers, industrial motor buyers and the replacement market, as well as other business firms, foremen's groups, civic and professional organizations.

"Motors on Parade" illustrates how electric motors have improved daily living and working conditions in homes and factories, farms and transportation. Fea-

NEW, IMPROVED **NU-MATIC**



THE WHEEL WITH THE PNEUMATIC DRUM

With this Nu-Matic wheel the abrasive belt rides on a cushion of air contained in a rubber drum. Different pressures in the drum and different grits provide varied surface finishes. Deflate, and belts can be changed easily and quickly for grinding, sanding or polishing. Cut your labor, production and inventory costs with Nu-Matic grinding units. Adapters for ⅝"-11 or ½"-13 power equipment. (Specify size.)



Adaptable to bench, portable or flexible shaft power.

NU-MATIC GRINDERS, INC., 10304 W. McNICHOLS RD.
Detroit 21, Michigan UNiversity 3-2573

tured in this film is Parker Fennelly, known for his role of Titus Moody in the Fred Allen radio program, "Allen's Alley." Fennelly narrates the Delco story in the role of "Old Timer"; he traces the history of Delco through a series of pictures in a company album, showing the development of the firm's products from the earliest equipment up to the present.

The second part of the motion picture takes up actual production, assembly, testing and inspection steps in the manufacture of motors. It closes with the assurance from Delco that it will continue to make mtors of continued quality and manufacturing ability, with the world-wide service and distribution.

This Moving World

16 mm. Technicolor, sound film. Three reels. Available from Association Films, Inc., 35 W. 45th St., New York 17; 206 S. Michigan Ave., Chicago; 351 Turk St., San Francisco; or 1915 Live Oak St., Dallas.

The first motion picture telling the story of malleable iron, "This Moving World", sponsored by the Malleable Founders' Society is available free of



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Balancing!

HI-EFF

Write for Bulletin 761

Use Taylor HI-EFF Static Balancers for accurate, high-speed, production balancing of sheaves, fans, pulleys, fly wheels, grinding wheels, impellers, tires and other rotating parts. Special data sheets available for your convenience. Send us drawings of parts to be balanced, and let Taylor engineer solutions to your problems.

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charge. It tells how malleable iron is made, tested and used. Edwin C. Hill, the radio commentator, is the narrator.

This film takes the viewer into the plants where malleable iron is made tough and ductile by a heat-conversion process. By means of the Technicolor camera, the picture demonstrates the metal's toughness, its resistance to heavy impacts, its ductility, the high resistance to corrosion, the easy machinability of malleable iron, and the versatility which makes possible sound castings.

"This Moving World" is recommended for showings at metal manufacturing plants, engineering societies, machinery manufacturing and automobile plants, technical and vocational schools, purchasing agents associations, etc.

Multipress—And How You Can Use It

30 minutes running time (approximately). 16 mm. black and white, sound film. Obtainable from The Denison Engineering Co., 1160 Dublin Road, Columbus 16, Ohio.

Here is an industrial film which shows typical, unstaged views of actual applications of the Denison line of the oil-

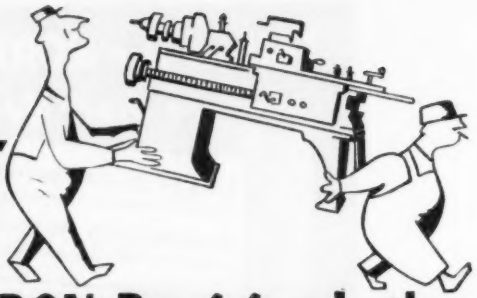


hydraulic 1-to-35-ton Multipresses. It is a carefully edited, fast-moving motion picture giving close-up action shots described in detail by an expert commentator. The film takes the viewer to the actual production lines of several leading manufacturers, revealing many examples of the methods of use of the Multipresses.

The picture demonstrates the compactness and versatility of this popular machine tool. Its safety, quietness of operation, time and work-saving features, as well as its simplicity of operation are all brought out. Typical operations, and brief "case histories" are shown. The various types of press operation, including forming, riveting, staking, broaching, and crimping are all indicated in interesting detail.

The variety of applications which this press can accomplish is illustrated; application shots which demonstrate how the Multipress boosts production on subassemblies are shown, as well as showing the use of the unit in final assembly operations. The film closes by presenting views of the modern testing laboratory and its facilities for testing on specific jobs for prospective customers.

Replace for PROFIT with SHELDON Precision Lathes





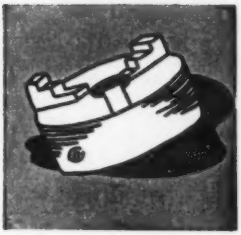
The great bulk of everyday tool room jobs comes within the capacity of Sheldon Precision Lathes — can be done with equal accuracy, at lower tool cost, lower power cost, in less time, *and at greater profit* on a Sheldon than it can on many of the costly, cumbersome, space-wasting older lathes found in most shops.

These extremely accurate (Zero Precision Taper Roller Bearings), large capacity for size (1⅝" hole thru spindle), light, fast, easy to operate, space-saving, moderate priced lathes will turn out not only more pieces per dollar, but on many jobs, more pieces per hour, than most older large lathes. When figuring replacement of obsolete equipment, remember you can have two or more of these efficient little money makers for the tool investment you made for the large lathe you are replacing.

WRITE FOR CATALOG

SHELDON
CHICAGO

SHELDON MACHINE COMPANY, INC., 4240 N. Knox Ave., Chicago 41, Ill.



MTBB
MARCH 1951

What's New in Metalworking

Norton's New No. 26 Hyprolap

Designed for continuous finishing of small flat parts. Machine features automatic loading and unloading during lapping cycle.

A new arrangement of the No. 26 Hyprolap vertical lapping machine, adaptable for the finishing of small flat parts continuously, has been announced by the Norton Co., Worcester, Mass.

The new design features automatic loading and unloading during lapping cycle, continuous lapping with no down time except for dressing laps, high production with no sacrifice in accuracy or finish, simple work holder for easy replacement, automatic safety device to stop machine if work is loaded improperly.

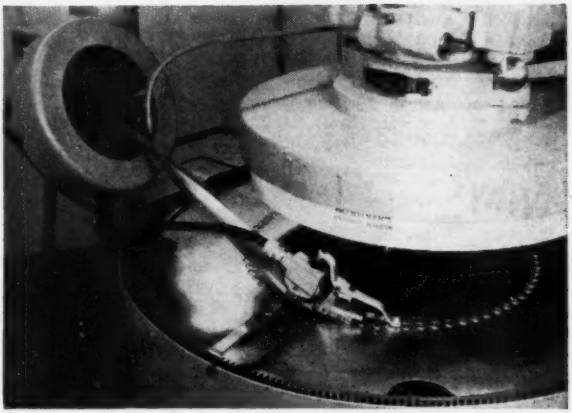


Fig. 1. This view of the continuous lapping arrangement of Norton's No. 26 Hyprolap vertical lapping machine shows the feeding device which automatically stops the machine of work is improperly loaded.

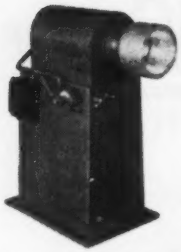
This new design is not intended to take the place of all existing lapping equipment since it should be considered for only those products having an unusually high production requirement. It is particularly well adapted to the production lapping of small flat washers and similar parts that offer no unusual problems in the way of rapid loading.

Most lapping operations will still require their own peculiar work holder design with the machine operator loading and unloading each part individually and controlling the lapping cycle. In those operations where the continuous feed arrangement is feasible, these duties have become almost completely eliminated.

Figure 1. shows equipment furnished for continuous or through feed lapping of small brass washers. At the upper left is the hopper containing the unfinished parts which rotates and picks up the parts in the slots. These slots are so machined as to allow the parts to seat with the raised surface down. They will also retain the parts if the raised surface is up but selective feed determines if the parts will be allowed to pass into

SCHAUER

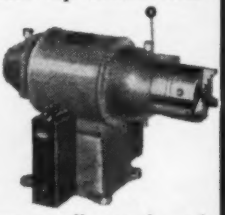
SPEED LATHES



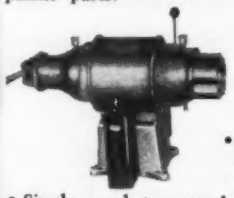
Who Uses Them?

General Electric • Aluminum Co. of America • Studebaker • Thos. A. Edison • Ford Motor • Westinghouse Electric • Owens Illinois Glass • Lockheed Aircraft • Western Gear Works • Bryant Electric • Royal Typewriter • Yale & Towne • Eastern Airlines • Minneapolis Honeywell • Remington Arms • American Locomotive • American Brass . . . and several hundred more top drawer companies!

Why?



Because Schauer Speed Lathes cut from 30% to 90% off the cost of polishing, filing, lapping or de-burring small metal and plastic parts!



- Chuck, collet or vacuum holding fixtures.
- Single speed, two-speed or variable speed models.
- SAVE WITH SCHAUER! Write for Bulletin 500.

SCHAUER MANUFACTURING CORP.

Originators of Today's Speed Lathes

2064 Reading Rd., Cincinnati 2, Ohio

the feeding trough spiraling from the upper inside of the hopper. The position of the mouth of the trough is such as to allow entrance of only those parts with the raised surface down, the others being discharged back into the hopper bowl.

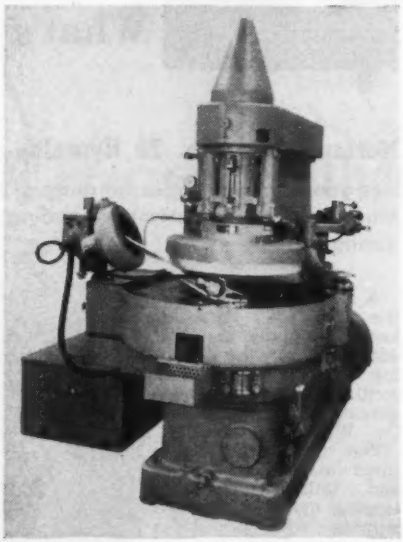


Fig. 2. Overall view of the No. 26 Hyprolap vertical lapping machine with the continuous lapping equipment in position.

• • •

The selected washers then feed by gravity down the loading chute to the finger loading mechanism which is designed to prevent ganging up of the parts and individually "fingers" each washer into the empty work holes as they pass underneath the loading point. In the event the parts double up or fail to load in the hole properly a finger automatically actuates a safety device, shutting off the power and stopping the machine.

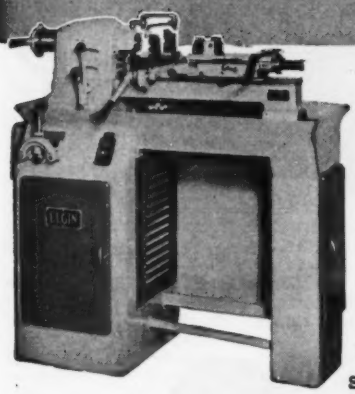
When loaded, the washers are then directed between the rotating abrasive laps in a path which leads from the outer edge of the laps to the inner edge and out again. This allows for breakup so essential to good lapping procedure and at the same time provides even lap wear, thereby reducing the number of lap dressing operations to a minimum.

ON SMALL DIAMETER PRECISION PARTS

Elgin

WILL MACHINE THEM . . . .

Faster: More Accurately



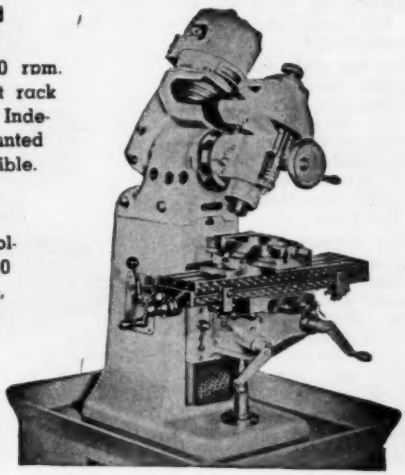
If your production problems depend on the speed with which small parts are machined, an ELGIN may be your answer. The line of ELGIN High Speed Precision Bench Tools is designed to pay you dividends in better machining results, faster production and greater versatility. Write for specifications, prices.

Elgin Knee Hole Type Hand Screw Machine

Variable speed range, 120 to 3800 rpm. 9" swing. 1" collet capacity. Collet rack inside of motor compartment door. Independent coolant system (5 gal.) mounted in rear, outside—cleaner, more accessible.

Elgin Vertical Bench Milling Machine

Preloaded ball bearing spindle. 9/16" collet capacity. Five speeds ranging from 400 to 4000 rpm. Vertical travel of spindle, 1¾". Table 4⅛"x18". 90° swivel each side of center line.



ELGIN TOOL WORKS
1772 Berteau Ave., Chicago 13, Ill.

New Right Angle Chucking Lathe

Lathe fills need for facing, turning, and boring thin-walled sections of large diameter and short length. Machine is at present used for facing the huge thin-walled "shroud" of jet engines.

The 60" Angle Chucking Lathe was developed by The Lodge & Shipley Co., Cincinnati, O., to fill a need for facing, turning, and boring thin-walled section work of large diameter and short length. Average industry has for a long time depended upon either a raised engine lathe, gap lathe, or vertical boring mill for machining this class of work. The Right Angle Chucking Lathe however, supplants such use of those machines by introducing a bed in the shape of a "T". The section of the bed carrying the carriage is at right angles to the center line of the lathe. Thus, facing at right angles to the center line can be accomplished by the movement of the carriage. Facing in and out a total of 31" from the center line to the front of the machine, as well as 6" to the back is readily accomplished.

The top slide has power angular feed in any direction and a total travel of 16". Straight or taper boring or turning can be accomplished. The top slide can travel 12" in a forward direction and 4" to the back.

The headstock on the machines manufactured to date make use of the "Large Hole in Spindle" type. That type is used in order that workpieces that have an extension which will not be machined, can be chucked or fixed to a driving fixture in such a way that the workpiece extension can protrude through the hole in the spindle. A lot of the work

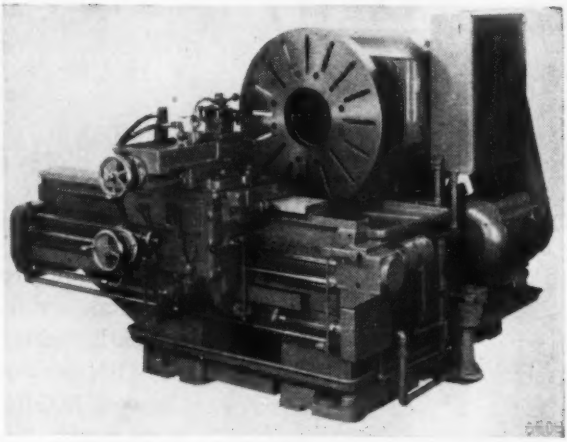


Fig. 1. Side view of the Lodge & Shipley Right Angle Chucking Lathe.

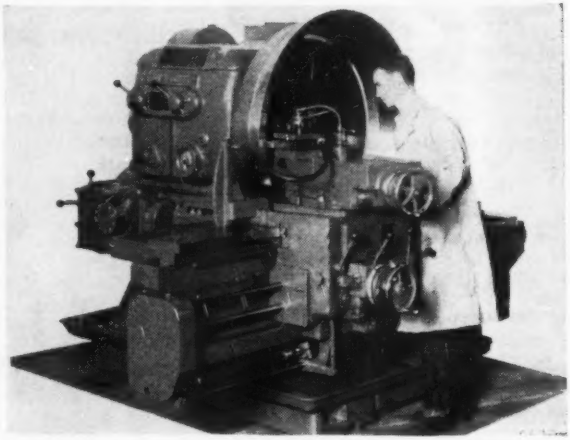


Fig. 2. A large diameter workpiece is being machined on the new lathe.

which is adaptable to the Right Angle Chucking Lathe may be simply clamped to the face plate. The lathe, however, is also arranged so that the regular type of headstock may be used instead of the "Large Hole in Spindle" type. Four headstocks which may be used.

Since the 60" Right Angle Chucking Lathe was designed to fill a specific need and is in fact at present being used on a variety of turbo-jet engine parts being machined by the Pratt & Whitney Aircraft Corporation, Experimental Division, E. Hartford, Connecticut, it has certain special characteristics which make it admirably suited for that class of work. The workpieces handled best are generally light in weight, large in diameter and relatively short in length. The materials commonly used are stainless steel and the lighter alloys. The machine is, therefore, designed to be controlled with ease and quickly, and in such a manner that the operator may readily follow the path of the tool and easily take required measurements. The operator has full control of all operating functions of the machine at the apron position.

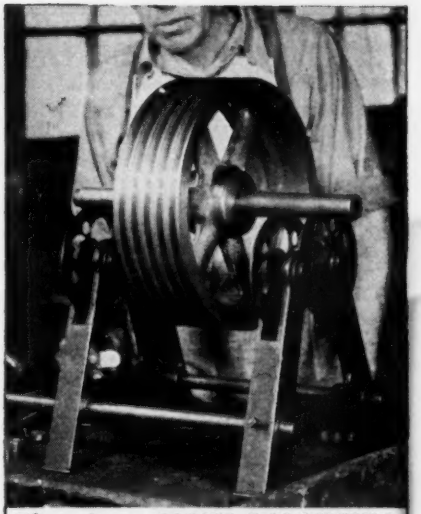
Some other design features include: independent control of the facing and turning feeds in either direction, built-in rapid traverse operated from apron control lever, power angular feed in any direction, electric jog at headstock for changing spindle speeds.

Major specifications include: max. swing over bed 60"; dia. of standard face plate 37"; travel of facing carriage 31" to front, 6" to rear; max. depth of face plate 12"; number of spindle speeds 24 from 4-225 r.p.m.; horse power 4 to 15 h.p.

Clark Horizontal Stock Reel

The Clark Horizontal Stock Reel has recently been introduced by Jaco Devices, Inc., 102 High St., Hingham, Mass. This ingenious device is stated to solve the greatest problem of all coil feed presses by eliminating "snatching" of the material, and overcoming the effect of eccentricity of heavy coils. Hitherto several methods have been devised involving electric motors, photo-electric cells, mercury switches, etc., and these various devices have been introduced to overcome the static inertia of heavy coils of material.

The Clark Reel introduces, instead, a solution of using the material itself as a medium to keep the coil slack. Other types of stock reels have been designed



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Our complete line of sensitive balancing tools includes eight different sizes and types. They are widely used on automobile tires, cotton gin brushes, crankshafts, flywheels, cones, pulleys, polishing wheels and other products. You'll find the balancing tool best suited to *your* work in this line of eight different sizes and types.

CAPACITIES

Swing	Between Standards	Weight Capacity
21 in.	20 in.	12 lbs.
21 in.	20 in.	800 lbs.
43 in.	29 in.	800 lbs.
43 in.	29 in.	2,000 lbs.
6 ft.	5 ft.	5,000 lbs.
8 ft.	8 ft.	10,000 lbs.
Any	Any	24,000 lbs.
43 in.	30 in.	800 lbs.

FREE DATA



You can obtain complete information on Sundstrand Balancing Tools by writing for bulletin No. 405.

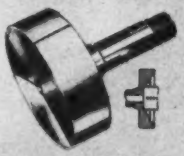
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IMMEDIATE DELIVERY FROM STOCK



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Step collet for accurate chucking to 2¾" dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

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(AC-50)



All collets in hexagon, square and round.

FOR ATLAS • LOGAN • SOUTH BEND
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DRAWBAR
½" cap.



Positive grip on undersize, oversize or standard diameter work! Patented coordinate cams eliminate fingers.

Let us quote on your quantity orders for any type of collet, live center or other machine tool attachment!

HAND
DRAWBAR
½" cap.



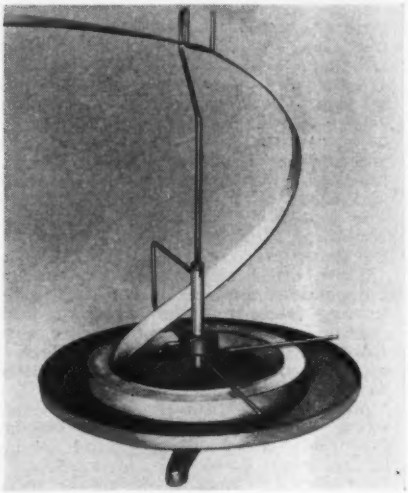
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(Ball Bearing) Double sealed for accuracy.

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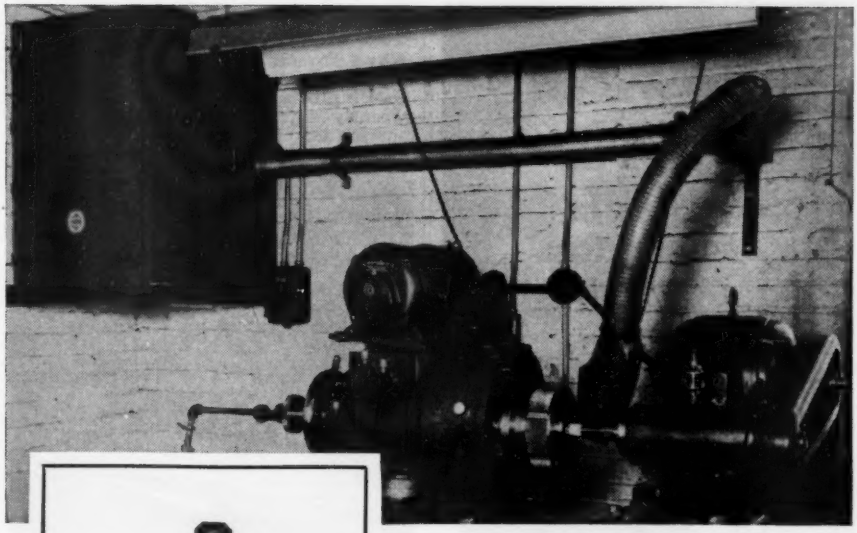
GENERAL DIE AND STAMPING CO.
Integrity Since 1919
264 MOTT STREET • NEW YORK 12, N. Y.

to take the material from the outside of the coil, thus tightening the stock on itself, thereby causing "snatching" of the material. With the Clark Stock Reel, the opposite is done. The coil is set down on a freely rotating disc, and the material is taken from the center and fed over a support straight to the press. As the material is taken up, the inside of the coil of material tends to reduce in diameter, until the natural spring is thus induced to turn the reel. By this method, there is no snatching, because there cannot possibly be any tightening of the material.



The size and weight of the coil have no effect on the working efficiency of the reel and there is no time lost in setting the coil up, to get it running true. All that is necessary is to place the coil on the turntable of the Clark Reel, pick up the inside end of the material, and feed it to the press.

The Clark Horizontal Stock Reel is primarily intended for use in connection with automatic pressfeeds. Since automatic feeds must take material that is running free, it was to gain this end that the Clark Reel was originally designed. Exhaustive tests on production runs have proved the method to be entirely satisfactory. The Clark reel has a 30″ diameter of turntable on standard reel; a maximum diameter of coil taken of 28″; maximum width of material accepted by the reel is 6″; the unit weighs 40 lbs.





Torit Dust Separators

Torit also manufactures a line of cyclone type dust separators, in sizes ranging up to 5 H. P. Many are designed for indoor recirculation of the filtered air. Above is a Twin Cyclone unit that delivers 2100 c.f.m., velocity 6,000 ft. per min., static pressure, 3".

I'll be hanged . . .

if you can't do a better job with

Torit Dust Collectors

Torit Dust Collectors are self-contained units for capturing and cleaning dust laden air from around grinding, polishing, and other dust creating machines. Compactly designed, they are easy to fit into present and future production layouts, for they will go most anywhere.

In the installation above, a Torit Dust Collector is hung from wall brackets. Others have been hung from ceilings, placed under the machine, or tucked in odd corners wherever a bit of space is available.

This compactness means efficiency. Torit Dust Collectors can be set close to machines, minimizing pipeline losses. They can be wired through the same starting switch to eliminate idle running and, as they recirculate the air after cleaning, no room heat is lost.

For details and latest Torit catalog, write:

TORIT

Manufacturing Co.

303 Walnut St. • St. Paul 2, Minn.



Meet sudden demands for high speed production by having every lathe equipped with the Allison Collet Chuck. Gives full spindle bore capacity to any lathe having 1½"-8 thread spindles. Requires no keys, wrenches, reverse switching or stopping. Operator simply draws lever ball toward him to tighten collet; pushes it away from him to release. Mail the coupon for complete, illustrated description and prices.

ALLISON CHUCK PRODUCTS
738 20th Street
San Pedro, California

Please send catalog page, prices and name of nearest supply house.

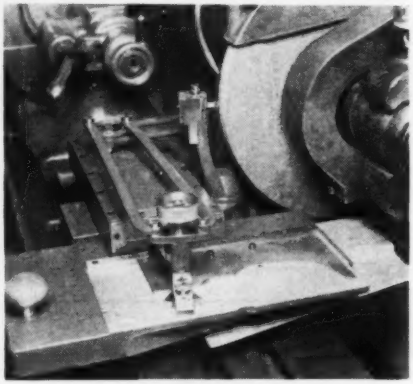
NAME_____

ADDRESS_____

CITY_____ STATE_____

Hoglund Contour Wheel Dresser

The Magni-Form (trade mark) Contour Wheel Dresser for cylindrical grinders is a new precision device for the contour grinding of cylindrical production work, recently introduced by Hoglund Engineering Co., Union, N. J.



The Magni-Form Wheel Dresser, available in two models, No. KB 14-1 and KB 14-2, is stated to be able to dress any complex contour which can be entered by the diamond. It is a manually operated device, mounted back of the footstock on a universal grinder. The unit is primarily designed for flat top universal grinders, but can be adapted to other types as well. Its primary advantages include simple operation, not requiring a highly skilled operator. The wheel dresser is light in weight, weighing only 65 lbs., compact, and well balanced, according to its manufacturer. The unit remains on the table during the grinding operation, saving time. It enables precise duplication to be made of complex contours.

The Hoglund wheel dresser operates from either a 5:1 or 10:1 template. Quick change over from one contour to another is a further advantage. It affords a simple, accurate method of setting the diamond. The stylus and the diamond can be rotated together through a parallel mechanism in order to retain the most favorable relationship between the contour and the point of the diamond.

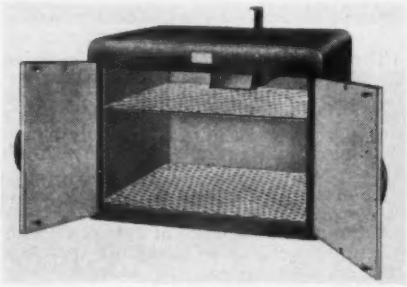
The smaller unit (Model KB 14-1) provides a width of contour of 1-1/16" maximum, a ½" maximum depth of contour on a 14" maximum diameter wheel. Template ratio is 10:1. Base dimensions are 14½"x7"; the height of the diameter

above the base is 7½". The larger unit (Model KB 14-2) alows a 2⅛" maximum width of contour, a 1" maximum depth of contour on a 14" maximum diameter wheel. Template ratio is 5:1. Other dimensions are the same as the Model KB 14-1.

Portable Industrial Electric Oven

A new Portable Electric Oven has been introduced by Grieve-Hendry Co., Inc., 1101 N. Paulina St., Chicago 22, Ill. Thoroughly field tested, it has been found practicable for many industrial uses including: baking enamels, lacquer, wrinkles and other finishes; for dehydrating bobbins, coil forms, paper tubing; for drying plastic granules, parts after cleaning; for preheating molds, and other uses.

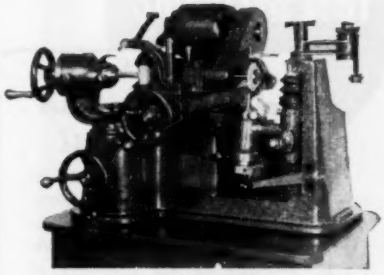
Uniform temperature is provided throughout the unit. Fresh air is drawn in and stale air driven out through specially located vents by means of a fan driven by a motor mounted on the outside of the unit. It is claimed that no stratification is possible, and that change of air and forced circulation is advantageous for any dehydration and baking process. An adjustable damper gives a wide range of constant temperature.



Construction is heavy gauge steel with asbestos air-cell insulation. The Model CR-1, illustrated, has a single phase 110 volt motor. It can be operated from any 110 volt outlet—no special wiring is required. D.C. units are also available.

The dimensions are 29" wide, 24" deep, 20½" high, inside. A removable shelf permits use of the entire height. Removable shelf and drip pan are standard equipment. The oven comes ready to operate. This model is capable of heating to 225° in 15 minutes. Other models for higher temperatures or models with four shelves, or specials are available.

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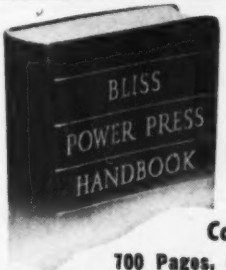
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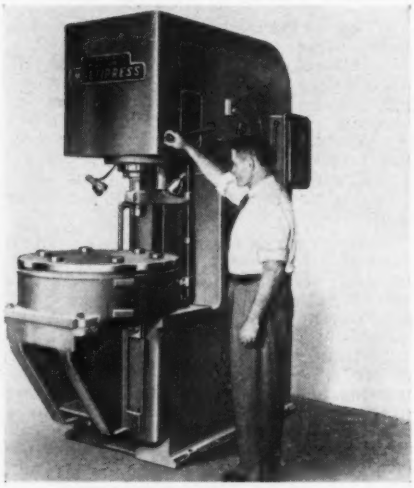
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Denison 50-Ton Oil-Hydraulic Press

Fast action with high-tonnage pressures under accurate control are among the advantages of the 50-ton Multipress, the new oil-hydraulic press announced by The Denison Engineering Company, 1160 Dublin Road, Columbus 16, Ohio.



The 50-ton Multipress extends the range of oil-hydraulic presses in this line beyond the 1 to 35-ton capacity units. It has a 15" stroke, 24" daylight opening and a work surface of 31" x 19½", providing more die space in keeping with the higher tonnage capacity.

Approach of the ram to work is variable and can be preset at any speed desired up to a maximum of 290 i.p.m., with pressing speeds up to 145 i.p.m. Approach and pressing speeds are independently adjustable, permitting rapid traverse with slow entry of punch into dies, and similar combinations for exacting work requirements. Other operational factors that can also be preset include the ram stroke length and pressure. Either pressure or distance reversal is another feature.

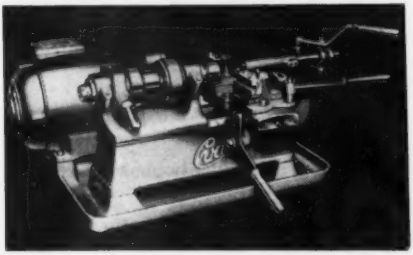
The adjustable characteristics of this press permit unskilled operators to turn out production quality parts at full speed. Controlled uniformity of finished pieces results in fewer rejects and lower inspection costs. The press may be equipped with either dual hand lever, single lever, foot pedal or electric push-button type controls. It is available in manual and automatic models for single

cycling, continuous cycling, or vibratory repeat strokes. Automatic ram cycling also may be used in conjunction with variable speed approach, and interlocking hydraulic accessories. Added advantages include inching control of the ram for quickly locating dies and tooling during set-up periods.

Second Operation Bench Lathe

The new C.V.A. Second Operation Bench Lathe has been introduced by DCMT Sales Corp., 164 Duane St., New York 13, N. Y. This machine is equipped with a collet attachment, tailstock and compound slide, all lever-operated, on which the front and rear toolholders are adjustable for height while angular adjustments up to 22° left and 33° right can be set on the front tool slide; adjustable dead stops are provided for both the compound slide and tailstock.

The drive from the two-speed motor to the main spindle running in adjustable bronze bearings is by a flat belt provided with an adjustable jockey pulley for tensioning. The unit is complete with a ¾ h.p. motor and switch gear (1500 and 3000 r.p.m.) for 220 volts, 3 phase, 60 cycles a.c. supply; and ½″ diameter headstock collet and one ¼″ diameter tailstock collet are also provided as standard equipment.



The specifications of this second operation machine include a 3 15/16″ height of centers. The maximum diameter through the spindle is 7/16″; maximum diameter through the tailstock collet is ¼″; maximum diameter through the headstock collet is ½″. The maximum distance from the tailstock spindle to the headstock is 2¾″; minimum (ditto) is ⅜″. Maximum traverse of the cross slide is 1⅛″; maximum traverse of the front tool slide is 2″. Spindle speeds of 1020 and 2010 r.p.m. are provided for the unit.

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9″ FLUTE
12″ HIGH SPEED 12″

Size	Price Each
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9/64″ x 12″	1.71
5/32″ x 12″	1.71
11/64″ x 12″	1.71
3/16″ x 12″	1.71
13/64″ x 12″	1.82
7/32″ x 12″	1.82
15/64″ x 12″	2.00
1/4″ x 12″	2.00
17/64″ x 12″	2.12
9/32″ x 12″	2.12
19/64″ x 12″	2.29
5/16″ x 12″	2.29
21/64″ x 12″	2.59
11/32″ x 12″	2.59
23/64″ x 12″	2.88
3/8″ x 12″	2.88
25/64″ x 12″	3.17
13/32″ x 12″	3.17
27/64″ x 12″	3.47
7/16″ x 12″	3.47
29/64″ x 12″	3.76
15/32″ x 12″	3.76
31/64″ x 12″	3.76
1/2″ x 12″	3.76



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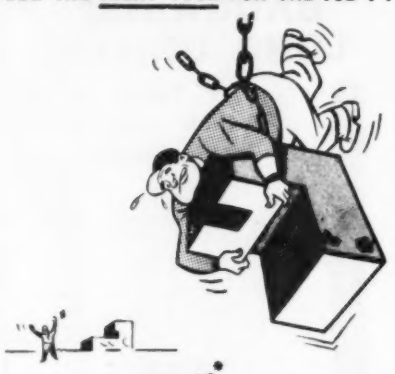
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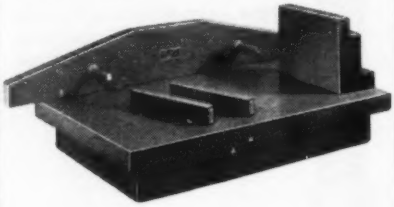
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Boeckeler Toolmaker Microscope

The Model No. 1 Toolmaker's Microscope, recently announced by the Boeckeler Instrument Co., 31 E. Rillito St., Tucson, Ariz., is stated to be able to make all the precision measurements which can be made by either a micrometer or an optical comparator. It is also capable of making many measurements which neither of those instruments can handle efficiently. The Boeckeler Toolmaker's Microscope is not susceptible to dangerous errors resulting from unavoidable variations in pressure which may be applied by the operator. Errors from heat distortion (as often occur with optical comparators with strong illumination) are also eliminated.



Operators can quickly make measurements accurate to .0001" with this instrument. After the piece to be measured is placed on the work table, the latter is moved against the micrometer spindle which has been set at zero reading. The microscopic tube is positioned and focused over the first measurement point, the micrometer head advanced, and the reading noted. The work table is next moved by hand or by the micrometer head to the second measurement point, and the second measurement is similarly made. Subtraction gives the distance between the two points, accurate to .0001".

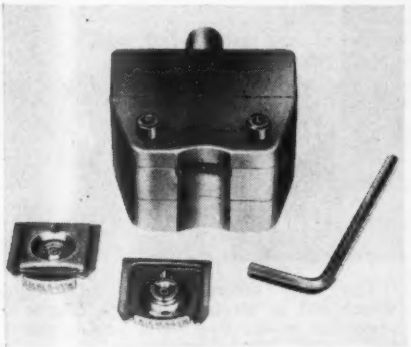
The micrometer head of the instrument is accurate throughout its entire range to .000060", but since it is not necessary to operate the head for more than a

½-inch excursion, the expected range of error drops to .000030". The non-rotating spindle eliminates possible wear on the gage rods which are made of h.s. steel, hardened and lapped to .000020", further minimizing any possibility of error.

The 4" x 5⅜" work table of the instrument has a 6½" range. Coordinate measurements can be made by turning the work 90° against the stop plate on the work table, thus giving a 6½" range in both directions.

Small Diameter Parts Marker

For marking the outer circumference of small diameter parts, a new Periphery Press Holder has been developed by M. E. Cunningham Co., 149 E. Carson St., Pittsburgh 19, Pa. This new Model PPH-10 holder is custom-made for each job, with the radius, size and number of characters determined by the piece to be stamped.



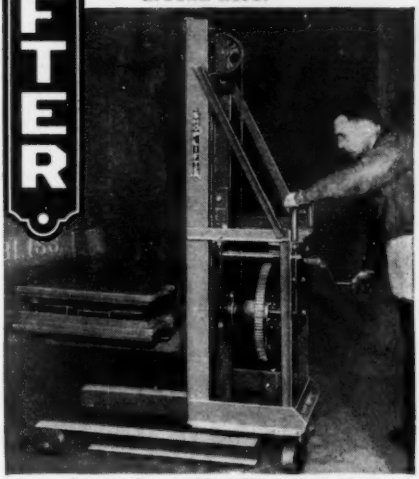
Made with shank size to fit any press, this press holder is designed to use regular straight sided type, thereby eliminating the extra expense of the curved type normally used for marking curved parts. A removable plastic side plate holds the type firmly in place. The plastic in this piece is pliable and will compensate for slight variations in the body type.

Stadoil Manufacturing Company, El Monte, Calif., announces the appointment of C. W. Smith, 106 Dwight St., Pontiac 18, Mich., as representative to industrial users, jobbers and distributors. Mr. Smith has handled the automotive business of this manufacturer for several months, and now adds further industrial coverage with Stadoil (Diamond Lapping Oil), Hone Rouge, Grind-All and Head-Loose.

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Master Dual-Feed Profile Grinder

A new development in the metal grinding field is embodied in the Master Profile Grinder recently introduced by The Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11, Ohio. This machine is a heavy duty profile grinder which turns out close, accurate work rapidly on a wide range of metalworking jobs.

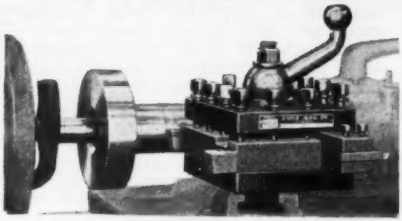


The unit offers several advantages which aid in attaining a high degree of precision in the free hand profile grinding of cams, special machine parts, master templates, contour gages, as well as in the finish grinding of hardened die sections, sectional punches and trim dies.

The outstanding feature of the machine is its tilting spindle. While the table is constantly in a horizontal plane, the spindle has an incline range of from 90° to 60°. A precision protractor, read by means of a lighted periscope from the top of the table, permits settings to within ¼". The controls are all conveniently located.

The large 24"x25" cast iron alloy heat-treated table is of heavy box-type construction; table extrusions can be obtained for use when grinding large templates. The spindle assembly accommodates grinding wheels from 1½" to 5" in diameter by 4" above the table; two speeds are available, 3000 and 6000 r.p.m., in order that maximum efficiency can be obtained from small as well as large grinding wheels. The spindle is oscillating

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Model No.	HD-2	6-S	4½-R	4½-S	3½-R	3½-S
Suggested Lathe Size	16" to 24"	14" to 20"	15" to 19"	13" to 16"	12" to 15"	10" to 13"
Tool Block Size	6½" sq.	6" sq.	4½" sq.	4½" sq.	3½" sq.	3½" sq.
Solid Tool Capacity	1½"	1¼"	1"	¾"	⅞"	½"
PRICE	**$152.50**	**115.00**	**73.50**	**59.00**	**49.50**	**39.50**

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or non-oscillating, as required. Grinding wheels can be easily changed and are adequately guarded. A diamond wheel dresser is available which permits the accurate dressing of grinding wheels with tapers up to 30°

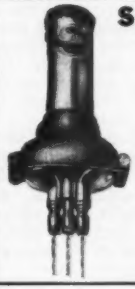
The cabinet is of welded construction, enclosed, and is equipped with a 4" dust pipe outlet for attaching to a dust collector. The motor and mechanism are designed for heavy duty work, are provided with force feed lubrication, and are oil-sealed.

Marquette A.C. Arc Welders

A new series of industrial alternating current Arc Welders has been announced by Marquette Manufacturing Co., 307 E. Henn St., Minneapolis, Minn.

The new Marquette industrial welders are available in three sizes—200, 300, and 400 ampere capacities—and are designed for heavy-duty, around-the-clock production welding.

One of the key construction features of the new 80 Series welders is the use of Hipersil Steel transformer cores.



SELLEW (Standard DRILL HEADS)

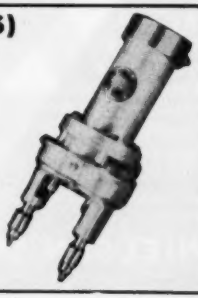
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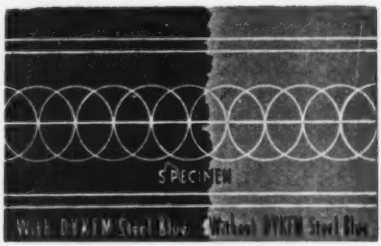
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No. 1D min. 1.16" max. 6.33"—No. 1 M.T.
No. 2D min. 1.4" max. 7.8" —No. 2 M.T.
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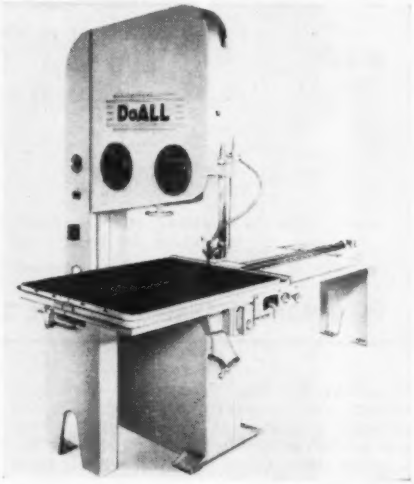


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DoAll HP-36 Bandsawing Machine

The DoAll Co., DesPlaines, Ill. announces a powerful new bandsawing machine, No. HP-36 Hydro-Feed. The throat capacity is 36″, work height from 15½″ up. The machine uses standard saw bands up to 1″ in width. It features a combination of power, speed range, hydraulic feeding capacity, and sawing versatility. The machine is well guarded and is equipped with automatic synchronized hydraulic aircraft-type brakes.



The Model HP-36 uses a 10 h.p. drive motor. It has a three-speed transmission and an overload protected Speedmaster variable drive that gives a tool speed range of 40 to 10,000 feet per minute. The 40″ x 49″ T-slotted hydraulic table will support work pieces weighing a ton or more. The table slides on 28 rollers distributed over a 36″ x 87″ bed. The table stroke is 36″, with 200 lbs. pressure available. Correct feed pressure is automatically controlled by the resistance of the work as the saw encounters changing material thickness. The infeed rate is controllable up to 18 feet per minute with quick return.

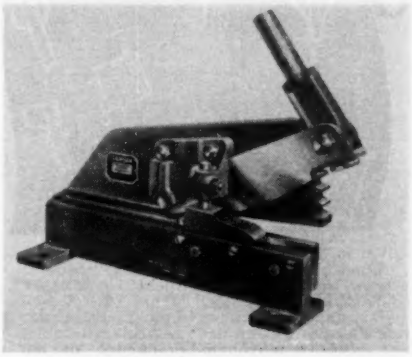
Standard equipment includes job selector dials and complete sets of guides for slow and high speed sawing, band speed and tension indicating dials, a converging-beam work light, a chip blower and dust spout for exhaust connection. The machine frame is of heavy welded steel box girder construction.

The Model HP-36 is designed for heavy duty precision sawing. It will cut thick dition it will friction-saw tough ferrous materials that can be machined with standard carbon steel saw bands. In addition it will friction saw tough ferrous alloys such as stainless steels up to ½" thick, several times faster than conventional sawing, according to its manufacturer.

Samson Hand Shearing Machines

A new line of hand lever slitting shears has recently been placed on the market by Julius Blum & Co., Inc., 532 W. 22nd St., New York 11, N. Y. These "Samson" Hand Lever Shears are constructed with an unbreakable steel plate frame. The frame is offset so as to enable the machine to cut sheet or plate of any length or width. The range of shears includes five models, the smallest having a capacity of ⅛" mild steel plate, and the largest with a capacity of 5/16" mild steel plate.

Shears up to 3/16" capacity are operated with toggle action, like the one shown in the illustration. Shears with ¼" and 5/16" capacity are constructed with a geared action which is extremely powerful, according to the manufacturer. On geared action shears, the lever handle is equipped with gear teeth which engage a rack cut into the machine. The shears are operated by a single stroke of the lever.

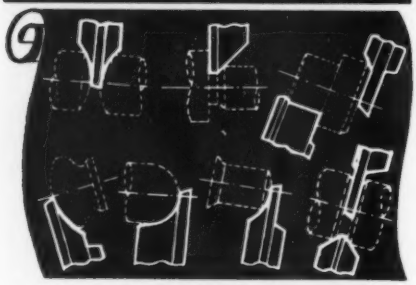


All shears have holddowns adjustable for the thickness of the material being cut. The machines will cut flats up to ½" x 3" in size, and rounds up to ¾" in diameter, as well as mild sheet steel.





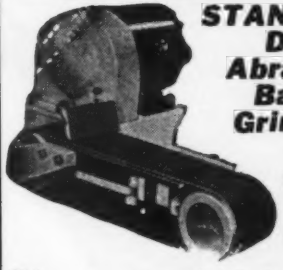
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Wardwell Hydromatic Flute Miller

A versatile new Flute Milling Machine provided with hydraulic operation has recently been introduced by The Wardwell Manufacturing Co., 3167 Fulton Road, Cleveland 9, Ohio. This unit, designated



as Model No. 90FM, performs a variety of operations; it indexes and mills either straight or special flutes in such cutting tools as counterbores and countersinks, taps and reamers, special or straight milling cutters, end mills, or any other special work requiring a dividing head.

The spindle is mounted in a quill on double rows or anti-friction bearings, with provision for expansion. The spindle is provided with a No. 9 B & S taper hole, so that milling cutter arbors on end mills can be used. A 3" overarm and arbor support is arranged to support the end of the cutter arbor.

The spindle is fitted in a housing which is mounted on a cross-slide swivel base on top of the vertical slide. The spindle housing can be swiveled to any position up to 45° for spiral fluting. The spindle is driven through a double V-belt by a 1½ h.p. Lima motor drive having four speeds.

The table is a gray iron casting, 28"x10"; the top is provided with two T-slots for holding fixtures; table is operated by a lead screw and is adjustable up to 9" travel. It is automatically operated by a hydraulic motor-dog controlled at each end of the stroke. The table feeds from 1½" to 30" per minute, with rapid traverse on the return stroke.

Indexing is automatic in operation and is further provided with an automatic locking device of the work arbor. Spiral milling is accomplished through a chain of gears at the end of the work spindle and connected to the lead screw in the table. These can be interchangeable to suit the lead of any spiral desired.

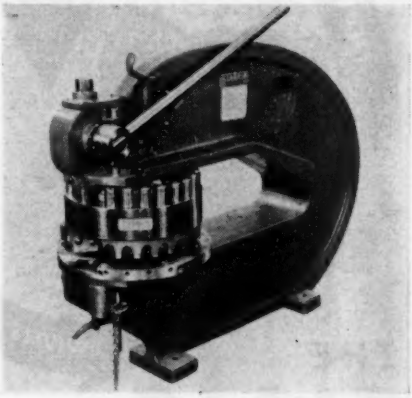
The 90FM Flute Miller has a capacity for taps, reamers, counterbores, etc. of from ⅛" up to 4" in diameter; spacing from two to forty flutes. The machine occupies a floor space of 40"x35"; height is 68".

Punch Press Handles 48" Sheet Sizes

Rotex Punch Co., 4726 E. 12th St., Oakland, Calif., introduces its 24"-throat "Model 18B" designed to handle sheet material up to 48 inches wide. The rotary turret—an exclusive Rotex feature—permits the operator to locate any one of 18 desired punch sizes almost instantly. The turret rotates to the required punch size, and locks in position automatically.

No time is lost in setting up; the machines are always ready to operate. 18 punch stations can be furnished on the standard turret in 5/64" to 2" sizes and these operate on fibreboard, plastic or sheet iron up to 10-gauge thickness.

Since dies and punches are accurately pre-aligned, the new unit insures a mechanically precise and perfect job without manual adjustments. Independent rotation of the turret and die plate increases



the versatility of the Rotex Punch Press however, and a safety lock prevents damage to the work, punches or dies if machine is not properly aligned.

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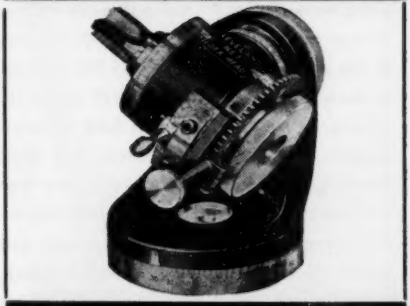


—head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

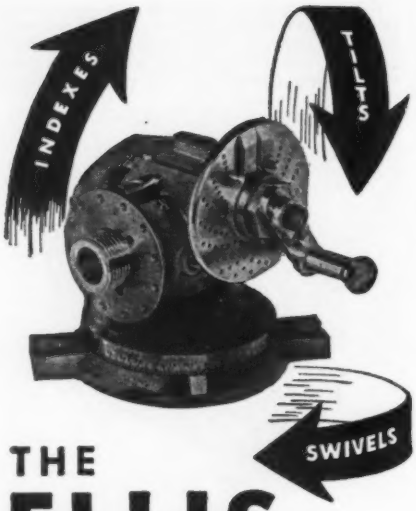
THE GRANT MFG. & MACHINE CO.
C E Station, Bridgeport 5, Conn.

TOOL HOLDER
INDEXING HEADS



Holds 1/16" up to 1½" Tools
5C or 1AM Collets and Brown & Sharpe or Morse Taper. Will adjust to any compound angle.

GRINDERS & FIXTURES INC.
8327 Clinton Road Cleveland 9, Ohio



THE
ELLIS
DIVIDING HEAD

Many unique features make the ELLIS Dividing Head more than an ordinary indexing fixture. It is a precise, rugged unit with 6½" normal swing increased to 11" swing through the use of riser blocks. It TILTS more than 100 degrees in the vertical plane—SWIVELS 360 degrees in the horizontal plane—INDEXES by crank, or directly by hand. Work is held between centers, or in chucks or collets. The ELLIS Dividing Head is a *universal* work head that will increase the production versatility of your milling machines, grinders, drill presses and jig borers—write for complete details today.

NICHOLS-MORRIS CORPORATION

50-G CHURCH STREET NEW YORK 7, N. Y.

Hand Operated Arbor Press

H. D. Herder, Tool Specialties, 2723 E. Michigan Ave., Kalamazoo, Mich., announces an addition to their line of hand operated tools, the HP-600 Arbor Press. This device is claimed by its manufacturer as an ideal pressure tool for jewelers, instrument makers, research laboratories, light manufacturers, etc.

The HP-600 Arbor Press is recommended for efficiency and economy in handling light high-speed production and assembly presswork. It incorporates all of the principles of correct arbor press design and provides approximately 800 lbs. of sensitive pressure and control necessary for pressing small shafts, gears, wheels and bushings up to a maximum diameter of 4⅝".



The 7¾" high frame, 3" diameter table, and table standard of the arbor press are close-grained iron castings, braced and accurately machined for strength and rigidity. The base of the frame has a 1" arbor opening and is finished to serve as an auxiliary table. The ram and pinion are special steel, and ram take-up is provided. Ram bearings in the frame are machined vertical to the table.

The press table has three slots for arbor work, ¼", ½" and ¾" wide. The table and table standard may be removed instantly to accomodate large work. Provision is made to use the table over the arbor opening in the base of the frame. The arbor press has a 2¾" capacity over the table and 5" capacity over the base. Ram is ½" square, and ram travel is 2⅝". The leverage ratio of the device is 16:1.

Now available for oil hardening in entire range of thicknesses . . .

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To give you even greater benefits from the money-saving, time-saving advantages of accurately pre-ground flat stock, Brown & Sharpe offers a choice of oil or water hardening steel in 16 thicknesses from 1/64" to 1"—145 sizes in all. In eight thicknesses up to and including 3/16", a single type now serves for hardening in either oil or water.

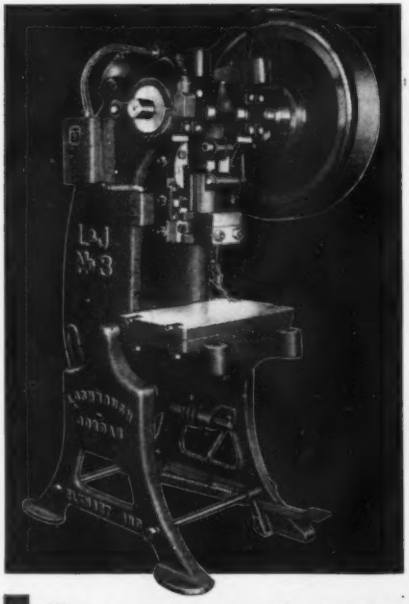
Continuous, repeat markings of type on each piece of Brown & Sharpe Ground Flat Stock make identification easy. Protective envelopes in different colors simplify handling.

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L&J PRESS CORP.

1625 Sterling Ave.

ELKHART, INDIANA

Flex Electric Hand Shears

The well-known line of Flex Electric Shears is now available through the firm of R. Caluwaerts Co., Inc., 1 W. 67th St., New York 23, N.Y., the U. S. distributors for these tools. Flex shears are stated to be sturdy and wear-resistant, standing up well under heavy duty use in continuous operation. These tools are available in four models, with a cutting capacity ranging from 16 to 7 gauge. Their design assures good visibility to the work at all times, permitting accurate shearing. Cutting along scribed lines is a special feature of Flex Hand Shears. The long handle permits safe and comfortable operation.



The range of cutting capacity for straight cuts is from 1.8 mm. metal sheets at 2½ meters per minute to 0.5 mm. sheets at a rate of 5½ meters per minute on the Model DP 4. The power consumption is approximately 80 watts. This model cuts black sheet metal up to a maximum thickness of 1.8 mm. The smallest radius is 20 mm. The weight is approximately 6 lbs.

The range of the Model DP 9 includes a cutting capacity for straight cuts of from 2.5 mm. metal sheets at a rate of 2½ meters per minute to 1 mm. sheets at approximately 6 meters per minute. The smallest radius of this model is 25 mm. It cuts black sheet metal up to a maximum thickness of 2½ mm.

Two other models, the DP 12 and DP 14 are also available with larger cutting capacities for straight cuts. Their maximum range in sheet metal is 3½ mm. and

4½ mm., respectively. The smallest radii are 40 mm. on the DP 12 and 60 mm. on the DP 14.

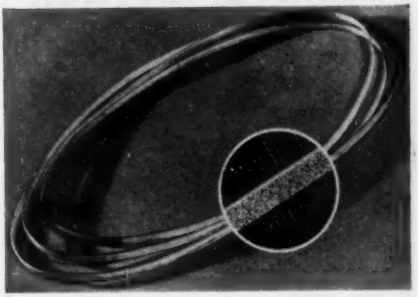
All models are provided with a universal motor for a.c. and d.c. of the same voltage; a metal housing with built-in tumbler switch and attached cutting arrangements are standard equipment, with three pairs of special steel cutters, a 3-meter cord with plug, and two spare carbon brushes.

New Diamond Abrasive Belts

The Hartford Special Machinery Co., Hartford 12, Conn., announces the development of its new diamond abrasive belt for use on carbide dies from ¼" to 9" i.d. These belts are made of solid nylon, impregnated with diamond abrasive in grades from 1-5 microns to a sieve or mesh size of 100.

The resilience of the nylon provides a cushioning effect against shock and prevents the diamond chips from tearing out of their sockets. Tests have shown that the Hartford Special diamond belts have outlasted other diamond belts by as long as twenty times.

These belts are not affected by humidity and can be cleaned simply by washing in warm soap and water. They are impervious to oil, allowing the use of light oil as a coolant. In many cases broken belts which are still usable can be rejoined without decreasing their effectiveness.

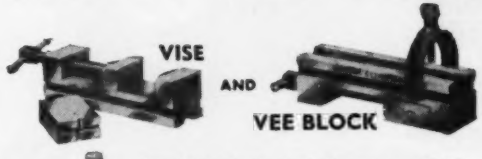


A special feature of the Hartford Special diamond belt is its "color coding." The color of the nylon belt indicates the abrasive size. At present five different colors are being used. Hartford Special diamond belts are available in standard lengths of 75" and 104". Standard widths in the smaller size of ⅛, 3/16 and ¼ inches, while the longer belts come in widths of 3/16, 5/16 and ⅜ inches.

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#235 Composite Vee Vise $16.50
All surfaces hardened & ground
Size 6-7/8 x 1¼ x 1-7/8
Complete with clamp & jaws
Two tools in one—A Toolmakers Vise — and Vee Block & Clamp

#1 Automatic Center Punch $1.80
Adjustable spring, replacable point

#160 PIN CHUCKS — $2.25
2½ long, 3 collets
Capacity: 0-3/38"

PIN VISES

#121	0—.040 —	$ .75 Each
#122	.030—.062 —	.75 "
#123	.050—.125 —	.85 "
#124	.115—.187 —	1.00 "

#110 Pine Vise (open jaw type) ¼ Cap. $2.00
#130 Pin Tongs — 0—.064 (set of 3) $2.50



#31 Vee Blocks and Clamps — $8.50
Case hardened & ground
Two Vee Blocks & Two Clamps



#30 Vee Blocks & Clamp $4.00
Cast Iron 2" x 1½ x 1½
Two Vee Blocks & One Clamp



#100B SURFACE GAUGE — $6.00
Case hardened base
Two spindles — 4" & 7"

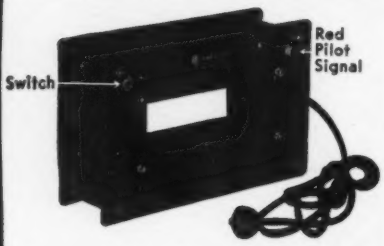
#101B — $9.00
Same as above, but with 9" & 12" Spindles

#104 SURFACE GAUGE — $4.50
Cast Iron base
12" Spindle; adjustable

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CAPACITY:
⅜" to 2½" drills.
5" x 9" adjustable table.

MOTOR: ½ hp, 3450 rpm.

NET WT: 250 lbs.

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EAU CLAIRE, WISCONSIN, U. S. A.

Federal Air Gage Has .003" Range

A new dimensional air gage, the Dimensionair, is announced by Federal Products Corporation, 1144 Eddy St., Providence 1, R.I. It has exceptional measuring range and clearance, combined with almost absolute stability, according to its manufacturer. The exceptional .003" range enables the user to determine the size of a hole before he reaches the ultimate size required. Irregular and tapered holes are said to be more easily gaged.

The gage's stability is claimed to be matchless; after the gage is in operation, drift is entirely absent after a period of hours or weeks. Setting the gage is accomplished in a few seconds; the setting is simple and positive, with no involved balancing of controls. The master jet is fixed, and no complicated adjustments are required.

The indicator hand moves quickly to position with no later creeping. The jeweled bearing meter is cushioned at both ends of travel to eliminate any damage.



Any air pressure between 40 and 100 pounds can be used. Normal fluctuations in pressure do not affect the gage's accuracy. Air pressure at the jets enables the plug to be used at production in coolants or oil. Greater plug clearance prevents dirt and grit from interfering.

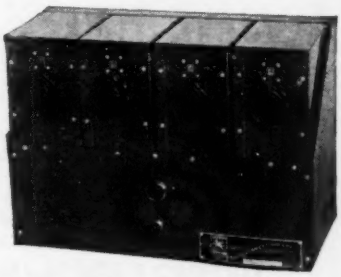
This air gage measures the dimension variation directly on its graduated scale. Each graduation represents actually .00005". Amplification is 2500 to 1. Only one master is required for setting; tolerances are read directly on the scale just as on a dial indicator. Variations as small as .000005" (5 millionths) can be determined.

Gage plugs and hole connections are made tight without wrenches, and no major adjustments are required when plugs are interchanged. A non-corrosive vinylite plastic hose connects the plug to the gage.

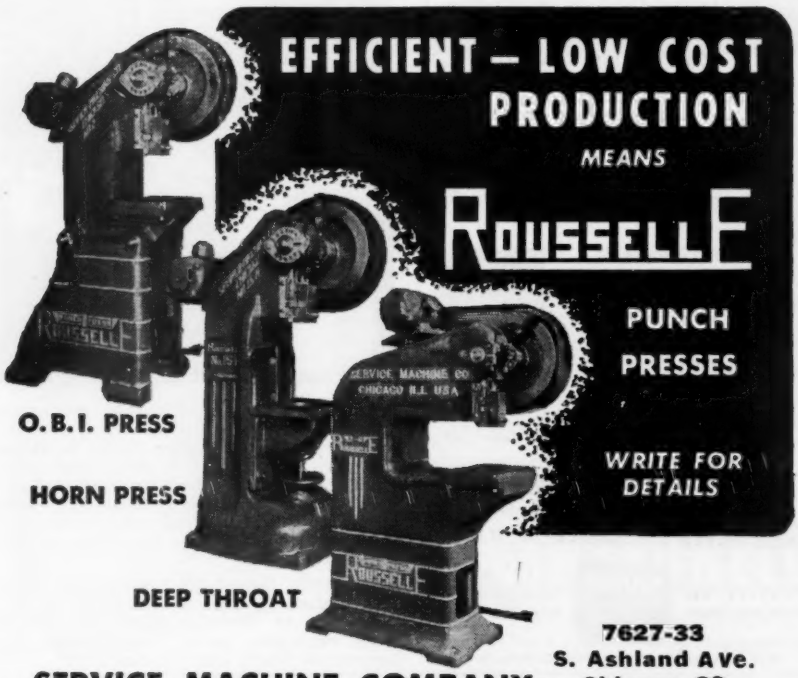
Predetermined Counting Device

A precision predetermining counting device which accurately controls any industrial process by which large numbers of articles or operations must be accurately regulated has been placed on the market by Streeter-Amet Co., 4101 N. Ravenswood Ave., Chicago 13, Ill.

This instrument records either numbers or time (or both at the same time) on paper tape for easy readability. The counter operates by any means capable of supplying a switch closure or an electrical impulse. Counts can be indexed by time or number printed alongside the count. When the predetermined count is reached, a circuit is put into operation which may be used to operate various electrical circuits. The Predetermining Counter resets automatically to zero. A manual reset switch is provided in the circuit.



Typical applications of this device are to predetermine the numerical quantity in a package, the number of sheets in a bundle, units of length in a roll, such as wire, cord, etc.





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SAVE TIME

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MILFORD Profile Saw has long been accepted by tool and die makers as a basic tool for internal or external contour sawing. Originated by MILFORD, this narrow blade for contour cutting has milled, precision-set teeth — follows a straight or curved line fast and accurately. Your MILFORD Distributor can serve you from stock.

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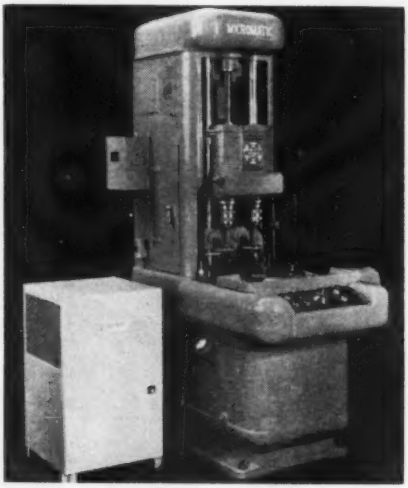
Profile and Band Saw Blades — MILFORD — Rezistor & Duplex Hack Saw Blades

Sold Through Select Industrial Distributors

Frostrode Industrial Fluid Coolers

The new Frostrode Industrial Fluid Coolers, manufactured by Frostrode Division of Viking Products, Vicksburg, Mich., are being introduced by Progressive Welder Sales Co., 3070 E. Outer Drive Detroit 34, Mich. These units, accurately control the temperature of coolants such as honing, grinding and cutting oils; water, hydraulic oils and plating solutions used in industrial processes. They use an air-cooled refrigeration cycle in cooling the oil or other coolant flowing through the cooler. The flow circuit is designed to provide a maximum heat transfer with a minimum pressure drop or flow restriction. Coils are constructed of either steel or copper tubing.

The illustration shows a Micromatic Hydrohoner Machine equipped with a Frostrode Fluid Cooler for supplying the coolant to the honing tool at a selected temperature.



According to its distributors, the use of Frostrode Industrial Coolers results in: higher production rate; closer working tolerance and higher quality finish on work pieces; a decreased number of rejects due to variation in tolerance ordinarily caused by temperature increase; increased tool life, and less tool maintenance.

Frostrode Industrial Coolers are built in standard models to handle most applications as well as in special models with explosion proof construction for hazardous fluids and locations.



EXCLUSIVE DISTRIBUTORS IN EVERY MAJOR LOCATION THROUGHOUT THE U.S. AND CANADA CARRY ALL SIZES IN STOCK FOR *IMMEDIATE FREE DELIVERY*. YOU ARE ASSURED OF

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- automatic indexing, grinding
- grinding wheel shaped to suit gullet of tooth to be ground
- grinds milling cutters, also

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PUT SMALL JOBS ON THIS

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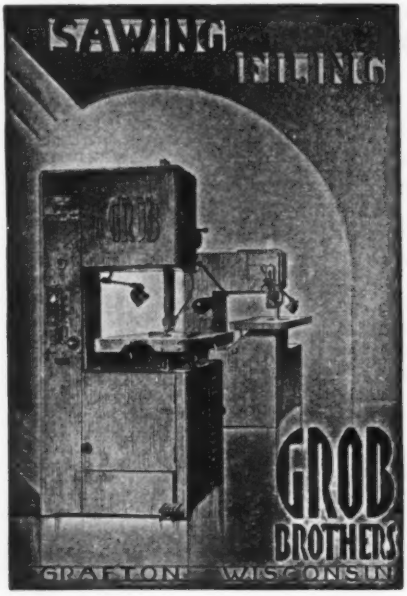
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at the extremely low first cost and the vitally important jobs that this little precision machine can do. It will pay you to get our accuracy information on this machine which has 6" x 10" table movement and 7' x 17½" table size.

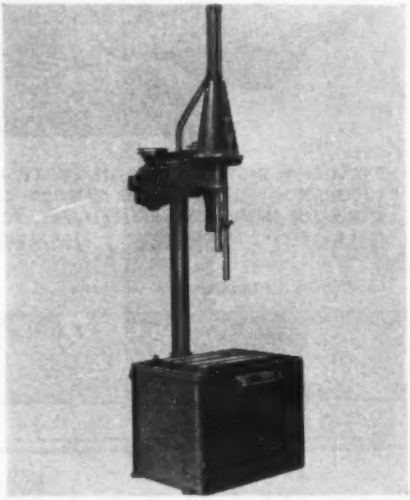
Write TODAY For Full Information

LINLEY BROS. COMPANY
663 State St. Ext.
Bridgeport 1, Conn.



Fulmer Model 415 Honing Machine

To meet the requirements of firms who desire to finish bores from ¼" to 4" in diameter, the C. Allen Fulmer Co., 1242 First National Bank Bldg., Cincinnati 2, Ohio, has introduced a new small machine with a working stroke of 15" and a capacity from ¼" to over 4".



This machine carries a 1¼" diameter heat-treated alloy steel spindle, driven by a 3 h.p. motor through alloy steel reduction gears, with three spindle speeds available. Reciprocation is hydraulic with a 2 h.p. motor driving a Vickers pump with Vickers controls that permit reciprocating speeds from one to 70 feet per minute. The spindle and honing tools are hydraulically counter-balanced at all times.

Standard height under the spindle nose is 40", with different heights optional. The standard work table carries three ⅝" Tee-L.C. Slots; for the customer who specializes on automotive cylinder honing, a special table with a built-in indexing cylinder holding fixture is available to replace the Tee-slotted work table.

As extra features, the Fulmer Stop & Dwell system for finishing blind holes, automatic cycling and a spindle brake are all available.

The machine is equipped with full push-button controls including push-button withdrawal at the end of the honing cycle.

The Fulmer Model 415 is engineered

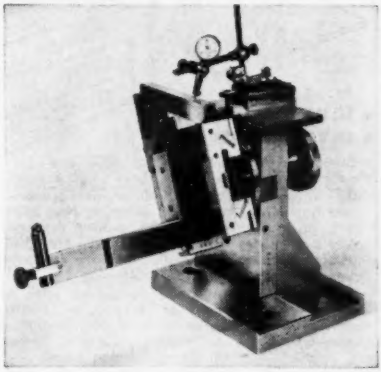
for heavy duty, constant operation on small, precise work, and is so arranged that job change-overs can be easily and quickly made. Various types of fixtures are available with these machines, along with honing tools from ¼" diameter upwards.

Universal Grinding Wheel Dresser

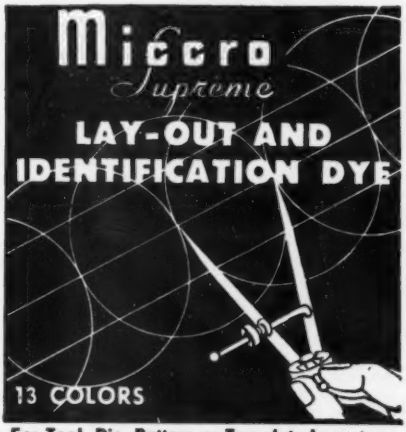
A new Grinding Wheel Dresser, manufactured by Universal Form Tool Co., 7410 Rutherford Ave., Detroit 28, Mich., is capable of dressing a complete form, rather than a single radius and angle tangent. This is made possible through movements in the column and base with a gauge block application. The angles may be set with a sine bar in addition to graduations. Absolute rigidity is accomplished by the pre-loaded ball bearing angle slides and the rotating bearings, according to the manufacturer.

The Universal Dresser is stated to contain greater range in the size of the radius, as well as in angle travel. It may be used under the wheel or at the side, and all settings may be made without removing from the machine. The device contains positive locks and stops which cannot distort.

When the goose-neck is removed, the Wheel Dresser may be used as a revolving fixture for the rolling of radius. All setting positions contain a .200" stop for settings starting from .0001" and up. The knob that revolves the radius actuates the slide when locked in angle position.

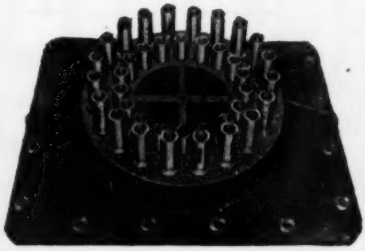


These features combine to make the Universal Dresser a complete, accurate and easy to use tool.



For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheet, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

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In
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Silvaloy No. 2501 and No. 5031 are clad materials furnished in three thicknesses:
.020 thick consists of .010 copper center—clad both sides with .005 Silvaloy No. 2501
.011 thick consists of .005 copper center—clad both sides with .003 Silvaloy No. 503
.016 thick consists of .008 copper center—clad both sides with .004 Silvaloy No. 503

Each of the alloys are furnished with or without radius, square or rectangular, Pentagon shape 80 degree with radius, Pentagon shape 60 degree no radius, triangle, circles, etc. Available in all standard tool sizes.

Shims are also available in Silvaloy No. 503, No. 2501, Constantine and Copper.

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THRIFTMASTER UNIVERSAL JOINT DRILLHEADS
2 to 10 (or more) Spindles.....Capacity to ⅞" in Cast Iron 6" to 10" (or larger) Circle

OTHER THRIFTMASTER PRODUCTS
Special Fixed Center and Standard Eccentric Adjustable Drillheads.
Multiple Spindle Automatic Reverse Tap or Drill Attachments.

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Division of Thomson Industries, Inc.
1030 N. PLUM STREET, LANCASTER, PA.
STANDARD UNIVERSAL ADJUSTABLE AND SPECIAL FIXED CENTER DRILLHEADS

General Purpose Marking Machines

A new line of general purpose marking machines is announced by Noble & Westbrook Manufacturing Co., East Hartford, Conn. The Noblewest 50 Series, consists of three models—an all-pneumatic, a semi-pneumatic and a hand operated type; all are suited for trade marking, part numbering, codifying and serial numbering on metal, wood, plastics and other materials.



These machines all use the Noblewest "roll-marking" process for trouble-free marking and permanent impressions on flat or round surfaces, which includes precision graduating, serial numbering and knurling.

The Model 50P1 (illustrated) features all-pneumatic operation, and will mark up to 1200 pieces per hour. Both the table and die slide are powered independently by heavy duty air cylinders. The machine is connected directly to shop lines; only one air control adjustment is needed, an easily adjusted pressure regulator that controls the pressure of the table and so determines the depth of mark. Cylinder sequencing is automatic, regardless of the table pressure setting. No secondary valve adjustment is necessary after re-setting the table pressure.

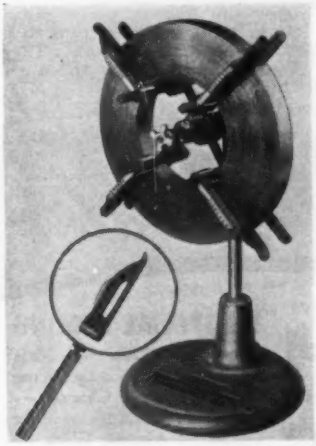
The Model 50P is semi-pneumatic in that the table is operated by air pressure, but the die slide is drawn across the work piece by means of a manual lever adjusted to "natural pull." In addition to ease of operation, the pneumatic operation of the table provides automatic compensation of work pressure. Production is

400 to 650 pieces per hour and air ejection unit for removing marked pieces from the table is adaptable.

The Model 50 embodies the design principles featured in the two pneumatic models, but is entirely manually operated. The table is raised by a foot pedal and the marking die is carried across the work piece by the same "natural pull" hand lever used on the semi-pneumatic Model 50P. This machine will mark 300 to 500 pieces per hour, depending on the speed of the operator.

R-F-C Model 2 Stock Reel

The latest addition to the line of power press equipment manufactured by Roll Feeds Corporation, Pawtucket, R. I., is the Model 2 Stock Reel. This useful device features quick-acting adjustable clamps, allowing coils to be positioned swiftly and securely. A hand knob adjusts the reel tension to the desired amount of drag. Rigid, heavy-duty construction of the device will give many years of economical use, the manufacturers state.



The magnified enlargement at the lower left of the illustration shows the new application of the clamps, permitting speed and ease in coil positioning. There are no bolts or screws to tighten; the operator simply presses in order to release or position the clamp.

The Model 2 Stock Reel has a 350-pound coil capacity. The minimum hole diameter is 7½", maximum, 17½". The maximum width of stock is 5½". The reel has a vertical adjustment of 7". Weight of the reel is 150 lbs.

PORTABLE
ELEVATING TABLE



Saves TIME and LABOR

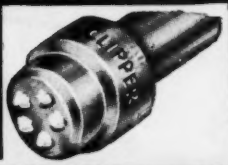
Eliminate heavy lifting and cut handling costs. Slight foot pressure varies height up to 15½", leaving operator's hands free. Table swivels and locks in any position.

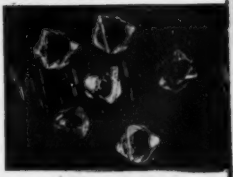
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CLIPPER
PRECISION DIAMOND TOOLS

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Thread Grinders
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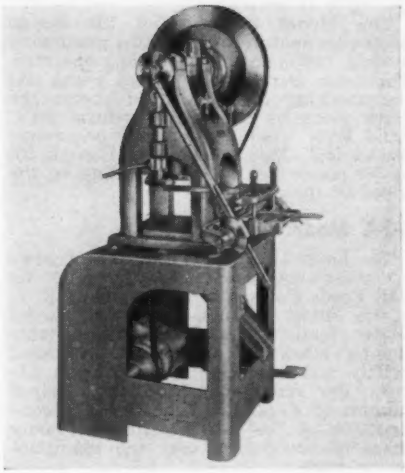
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Representatives in Principal Cities

CLIPPER DIAMOND TOOL CO., INC.
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Diebel 8-ton High Speed Press

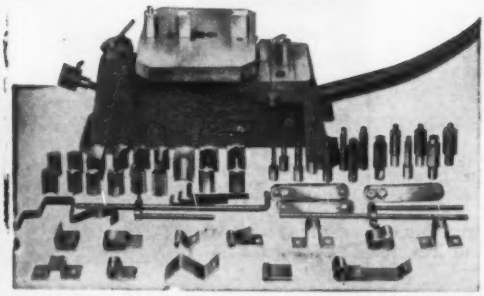
For a more complete coverage in the high-speed automatic press field, Di Machine Corporation, 2711 W. Irving Park Road, Chicago 18, Ill., has added a new 89-ton model to its line.



The new machine features a 5" diameter cylinder-type ram which slides in an adjustable bronze sleeve for greater accuracy and longer life. A variable speed drive provides adjustable press speeds from 110 to 350 strokes per minute. A rugged, precision built-in roll feed, either single or double construction, is standard equipment; it is easy to set, while maintaining a high degree of accuracy, according to the manufacturer. Feed rolls can be furnished hardened and ground, either rubber coated or knurled.

The frame of the press, with its four legs bolted to the bed insures permanent rigidity and accuracy. It houses the adjustable bronze sleeve for the ram take-up. The base of the unit is of welded construction, with the 1 h.p. motor and variable speed drive built in. The stroke of the press is either 1" or 1½" standard. Shut height of the press is a maximum of 6" over the bolster plate. The bed area, left to right is 12½"; front to back, 8". The bed opening is 4½"x5½". The new 8-ton press occupies a floor space of 24"x 30"x65" high.

THE MULTIFORM Bender



NO SPECIAL TOOLING

Bends & Cuts — Flats — Rounds Into Any Shape — Brackets — Clamps — Bus Bars — Springs — Wire Forms — Aircraft Work — Steel Rule Dies, Etc.

Hand or air models, profit producers in any plant also larger models for up to ¼" x 4" material.

J. A. RICHARDS CO.

DEPT. 5B, KALAMAZOO, MICHIGAN

A New Record

PRODUCTION INCREASED over 80%

by Lipe Automatic

Magazine-Loading BAR FEED



HERE'S THE JOB

Material: steel. Operations: (1) turn neck, (2) knurl, (3) cut off. Machine: B&S 00 screw machine. Part fed out in two positions before cut off.

RESULT: — with Lipe Automatic Magazine Loading Bar Feed attached — screw machine completed 969 pieces per hour, compared with 540 pieces per hour with conventional feeding.

Outstanding Production Records On Great Variety of Work, BECAUSE—

- *Stock is fed to screw machine all the time — not dependent upon operator.*
- *With Model AML you get maximum output of screw machine — No "cutting air."*
- *Pressure constantly behind stock.*
- *Eliminates feed fingers.*
- *Avoids multiple feed finger feed-outs.*
- *Saves in changeover set-up time.*

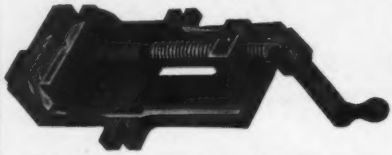
Get full details on how this machine will increase production and save you money. It's today's big advancement in screw machine stock feeding. Our engineers are glad to study your problem . . . no obligation.

LIPE ROLLWAY

Lipe-ROLLWAY CORPORATION

Syracuse 1, N. Y.

YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	3½	12½
2D	5	5½	23

Do you need a vise of ANY type?

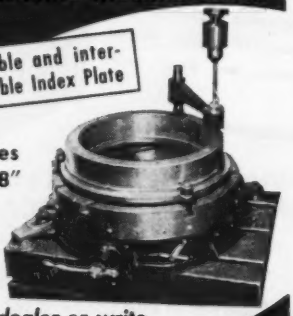
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YOST MFG. COMPANY

1335 SO. MAIN STREET
MEADVILLE, PENNSYLVANIA

Eliminate Costly Jigs with a TROYKE
BALL BEARING INDEXING TABLE

Removable and interchangeable Index Plate



Three Sizes
12"-15"-18"

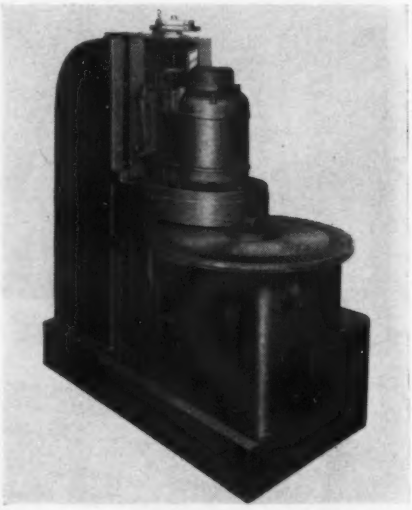
Also Worm-wheel Operated Rotary Tables 9"-25"

See your dealer or write for Catalog No. 14

Troyke Mfg. Co. Inc.
Cincinnati 9, Ohio, U.S.A.

Double Disc Grinding Machine

The Gardner Machine Company, Beloit, Wisconsin, announces a new double disc grinding machine, designated as model 2V-18. This unit is used to grind two parallel flat surfaces on small work pieces in one operation. Parts such as small coil springs, carbon brushes, ceramic materials and similar small parts can be economically finished on this machine.



Two 18" diameter solid center abrasive discs are each driven by 3 or 5 h.p. motors. These discs are each 2" thick. The 32" diameter rotary work carrier is made to suit the types and sizes of the work pieces which are to be ground. Finger tip speed control is provided for an infinite range of work carrier speeds between ⅛ and 1 r.p.m. A bayonet lock for the rotary work carrier permits rapid change of the carrier plate when changing work set-up or dressing the discs.

An outboard bearing under the rotary work carrier is used to insure extra stability to this flat revolving plate.

Both grinding heads may be independently adjusted by means of graduated hand wheels. In addiiton, each of these heads may be tilted for jobs requiring progressive grinding of the work piece. The path of the work pieces is directly across the center of the abrasive discs. With this method, a solid

disc may be used instead of a conventional type with a center hole. Savings in wheel cost are said to be considerable, since less frequent dressings are required.

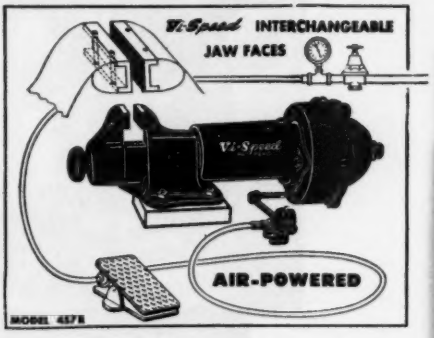
The dresser mechanism is enclosed in the main machine column. It is hand operated and fully adjustable for position. Dressing is done directly across the center of the disc so that no compensating settings have to be made when the heads are tilted.

Air Vises with Interchangeable Jaw Faces

After two years of tests, Interchangeable Jaw Faces have been introduced to the Vi-Speed line of Air Vises manufactured by Van Products Co., 2148 Baldwin Bldg., Erie, Pa. The faces are of hardened tool steel with either serrated or smooth surfaces, whichever convenience demands. They are firmly attached to the jaw castings by spring tempered pins driven into holes drilled in a manner to bind both faces and pins.

The jaw faces may be quickly and easily removed by driving out the pins with a punch, after which other faces can be rigidly installed. Extra faces are always available.

Vi-Speeds with Interchangeable Jaw Faces are stated to be especially valuable where heat is applied to the work near the vise. Continual exposure of ordinary vise jaws to high temperatures will gradually remove their hardness, but



should this occur with the new Vi-Speed models it is an easy matter to remove the jaws and have them rehardened or, after long use, to install new ones.

PRECISION BUILT MACHINIST VISE

Enclosed design prevents chips and dirt from entering internal parts. The balanced motion of a fine threaded spindle, moving freely in an ingeniously anchored sleeve type nut, eliminates dead motion and strain on moving parts. Head moves in precision broached keyway. Complete size range of bench and combination pipe vises. Before you buy, write for our descriptive catalog and give us the name of your preferred distributor.



5 YEAR GUARANTEE

WILTON TOOL MFG. CO.
925-E Wrightwood Av., Chicago 14, Ill.

WILTON
THE FINEST NAME IN VISES



"C" CLAMPS
OF PEARLITIC CASTINGS — tensile strength up to 80,000 P. S. I. — lower in price than forged clamps yet equally efficient.



Output of machined parts is speeded up without sacrifice of accuracy with a Super-Spacer. This indexing fixture allows rigid control of the machining operation, yet saves expensive setup time on long or short runs. Send for Bulletin S-101.

HARTFORD Special

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD 12, CONN.

The Enthone Pickling Inhibitor

A new type of pickling inhibitor designated as "Enthone Inhibitor 8" has been announced by Enthone, Inc., 442 Elm St., New Haven, Conn. Its advantages include high inhibiting action in many types of mineral acids (including hydrochloric, sulphuric and phosphoric), lack of odor, complete miscibility with pickling solutions, ease of handling and economy of use.

The inhibiting action in such acids as hydrochloric and sulphuric is as high as 99% even at temperatures up to 180° F. Besides the high inhibiting action with its attendant advantages for saving of acid, lowering attack on metal, and brighter pickling, the inhibitor lowers the surface tension of the pickling solution. This results in smaller pendant drops and acid films remaining on the work after pickling, lowering the drag-out from 10 to 30% depending upon the shape of the article.

The inhibitor is particularly recommended for the pickling of wire and tests have indicated a saving in acid drag-out as high as 30%. This saving in

Less Labor–
More Work–Bigger Profits

QUADRILL & QUAD-TAPPER



Increase Production 33%

Fits Directly on Drill Press

- Uses up to 4 drills and tapper on single press
- Saves moving of jig from one press to another
- Drills to full capacity of press
- Costs less than a drill press — does the work of 4
- A thoroughly PROVEN tool. Thousands in use.

Investigate this important work-saver. Write for literature today.

CHICAGO QUADRILL CO.

4528 W. ADDISON ST. • CHICAGO 41, ILL.

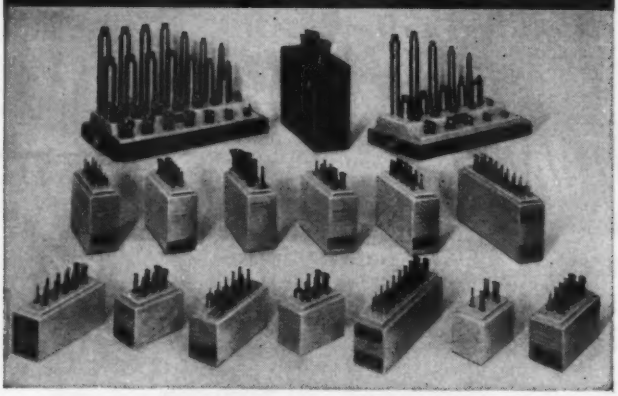
drag-out also is important because less acid is dragged into the lime solution that is normally used to neutralize the acid, resulting in a lower amount of calcium sulphate forming on the work that usually contributes to rusting and lowering the lubricating qualities of the lime. Inhibitor 8 does not increase hydrogen embrittlement of steel during pickling.

The amount of inhibitor required is relatively low, only 0.1 to 0.2% by volume of the acid mixture, or from one to two gallons per thousand gallons of acid solution. In case an excess of inhibitor is added, there is no danger of the formation of floating films to contaminate the work and, in addition, Inhibitor 8 has high tolerance to ferous sulphate.

New Gulf Electro Cutting Oils

The Gulf Oil Corporation, 722 Gulf Bldg., Pittsburgh 30, Pa., has introduced three new and improved grades of Gulf Electro Cutting Oils. The new products retain all of the performance features essential to good cutting oil operation and are transparent, highly sulphurized mineral oils containing maximum effi-

You should have one of these
JIG BORING SETS



Having boring tools in sets for jig boring makes for increased efficiency—always handy. Saves your time.

Bokum boring tools are put up in boxes to meet your specific needs—for precision boring of diameters from 1/16" up—economical, efficient, fast.

Send for folder H-1139-6 giving prices and detailed information of all assortments — super high speed steel boring tools.

Ask for H398—carbide tipped tools
Ask for H948—solid carbide tools

Bokum continues to serve you after the sale by providing a Resharpening Fixture to keep your tools in factory-new condition. Send for folder HAB-412.

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BOKUM TOOL CO.
14775 WILDEMERE AVE. · DETROIT 21, MICH.
SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

cient amounts of highly active sulphur. The new lighter and brighter color permits closer inspection of machine parts.

The new oils were subjected to extensive plant tests, with excellent performance in a wide variety of machining operations. Tool life increased as much as 100%, with additional benefits of improved surface finish, effective cooling of tools and workpiece, and maximum production on tough, high speed operations being gained through the use of the new oils.

The new cutting oils are recommended for heavy duty machining operations on ferrous metals and alloys, particularly for low machinibility steels. Excellent anti-weld characteristics and extreme load carrying ability permits use of these oils on heavy duty and difficult machining operations.

"Star-Dust" Lapping Compound Available in Applicator Gun

The Ace Abrasive Laboratories, 250 West 57th St., New York, N. Y., producers of "Star-Dust" diamond powders and diamond lapping compounds, announce that the latter, in addition to ophthalmic



- One roll marking die to tackle the exacting job of marking thousands of carpenter's squares. Clear accurate lettering was just as sharp for the 1000th impression as for the first. Individual segments can be removed, changed or replaced in seconds. One Parker Roll Die does the job of dozens of solid roll dies.
- The *flexibility* of Parker's Patented Taper Lock roll marking dies is solving difficult marking problems — saving down-time — saving money — every hour, every day for cost-conscious progressive manufacturers. This is but one of the exclusive Parker marking dies.
- For a better mark on *your* product, faster, cleaner, and at less production cost — investigate the *flexibility* of Parker's facilities. From stock marking numbers to specially engineered marking devices. Mechanical engraving and embossing. Parker marking dies for steel, brass, aluminum, plastic or wood.

SEND FOR THE *PARKER BLUE BOOK*

Steel Stamps, Marking Dies, Coining Dies, Embossing Dies, Mechanical Engraving and Special Marking Projects. Be sure to have the *Parker Blue Book* in your file.



THE PARKER STAMP WORKS, INC.
MARKING DIE & MACHINERY DIV.
by Parker
FRANKLIN AVENUE • HARTFORD, CONNECTICUT

tipped tubes, is now available in cartridges to fit a special Applicator Gun.

Benjamin Greenfield, president of the firm, says this of the new development: "We've always had what is considered to be the most accurately graded diamond powder ever produced . . . ready-mixed in lapping compounds in the most efficient densities. Such . . . compounds require a high degree of accuracy in their method of delivery to the individual job. Our new applicator gun does just this, delivering accurate minimum quantities without waste or contamination."

ALUMINUM QUIZ

Answers to quiz on page 91

1. Double
2. Temper
3. Severe
4. 960
5. Rough
6. Carbon
7. Wrinkles
8. Thinner
9. Severe
10. Original

PALMGREN
ANGLE VISES



HEAVY-DUTY Model

For Quick — Accurate Set-ups

PALMGREN Heavy Duty Angle Vises are built sturdy and rugged for tough, heavy jobs. They are accurately graduated in degrees, can be quickly adjusted to any angle, stay locked under severe service and save valuable hours otherwise wasted in tedious make-ready, wedging or making temporary jigs and fixtures.

Jaws are hardened and ground. Special outstanding features are the size and opening of jaws—4" Jaws open full 4"; the 6" Jaws open full 6" etc., with corresponding depth of jaws. Vises can be used as ordinary vises when lowered to horizontal position. Swivel bases furnished if desired. Sizes 4", 6" and 8" Jaws and openings. Prompt deliveries.

Write for Bulletin 8-1 "101 Angle Operations" and complete line of PALMGREN Vises

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Mfrs. of PALMGREN PRODUCTS for over 25 years

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PRECISION WORK AT ANY ANGLE

"DAVIS" KEYSEATERS



are moderately priced Efficient Economical Durable

Built in 3 sizes for cutting keyways 1/16" to 1" width. Circular upon request.

DAVIS KEYSEATER CO.

407½ Exchange St. Rochester 8, N. Y.

Norgren Micro-Fog Lubricator



The C. A. Norgren Co., 222 Santa Fe Drive, Denver 9, Colo., announces its new Micro-Fog Lubricating Device. This lubricator is said to develop a true fog in which extremely minute and uniform size particles of lubricant remain in suspension in the air stream.

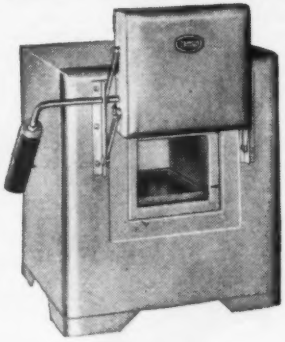
The basic advantages of this new principle of air-line lubrication are: (1) fog can be carried to greater distances than that developed in conventional lubricators; (2) it can be uniformly distributed through several outlets; (3) it is said to effect more thorough lubrication; (4) the air flow requirement is greatly reduced; (5) lubricator design and operation permits precision control of oil flow; (6) it does not require special lubricants; (7) it ends flooding of lines or equipment; (8) the device is fully automatic; (9) it features visible oil feed and supply.

The lubricator breaks down each drop of oil into extremely fine particles of uniform size — two microns (.00007874 inch) or less in diameter. The fog is created in the oil bowl. Particles of oil larger than two microns in diameter return to the oil supply and those of this and smaller size are carried over into the air stream. This is a relatively "dry" fog—capable of complete suspension over long distances and long periods of time—which becomes wettable only when subject to reclassifying action at the final point of application.

Approximately 5% of the oil flow seen in the sight feed glass is converted into the true fog which is carried into the air stream. This permits metering of the oil to as little as one drop per 20 minutes, if required. No oil drops enter the line; the possibility of oil collecting in the lines or flooding equipment is remote.

Because the fine oil particles remain in suspension, multiple units in simultaneous operation can be lubricated uniformly. Air flow requirement is remarkably low. Norgren Micro-Fog Lubricators are available in models to function over the complete range of 1 c.f.m. at 10 p.s.i. up to 14 c.f.m. at 80 p.s.i.

STEP UP PRODUCTION . . . CUT COSTS with



TEMCO®

HEAT-TREAT FURNACES

Eight convenient sizes of electric bench-type units to solve your heat-treat problems. Available with either electronic or manual temperature controls.

Priced from $55 to $500

Write today for illustrated Data File giving complete specifications on TEMCO Furnaces so widely used in industry today.

- ECONOMICAL TO OPERATE
- VERSATILE . . . EASY TO INSTALL
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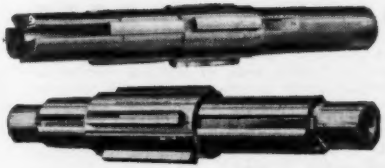
THERMO ELECTRIC MANUFACTURING CO.
486 HUFF ST. DUBUQUE, IOWA

Nicholson Expanding Mandrels

Cut "Machine Down" Time

Sensationally

Records in many shops show Nicholson expanding mandrels actually get operations completed in less time than was formerly consumed in providing solid arbors. In cases this results in a tremendous cut in "down" time. Set of 14 replaces 209 solid arbors, for all bores ½" to 7". Sold singly or in sets.



W. H. NICHOLSON & CO.
117 Oregon St., Wilkes-Barre, Pa.

Bulletin 750

Steam & Air Traps - Control Valves - Expanding Mandrels - Arbor Presses - Welded Floats

Pratt & Whitney Selectronic Gage

The new Pratt & Whitney Selectronic Gage is a highly accurate device designed to classify critical tolerances of precision parts such as balls, rollers, pistons and piston pins. A product of Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn., it is stated to permit broader production tolerances in the manufacture of such parts because it provides a selective control for precision fitting at the time of assembly.

Carbon vanes used in refrigerator compressor units are an example where accurate interchangeable assemblies of minimum tolerance are demanded. Through this medium of Selectronic assembly, a vane thickness tolerance of .0032″ is allowed, with the gage automatically separating the vanes into 32 classifications in increments of .0001″.

In this instance, the vanes are loaded into a magazine-feeding mechanism from which they are automatically fed under an Electrolimit gaging head and subsequently routed into the proper classification bin. The Electrolimit gaging head operates a photoelectric control unit which registers the size of the vane according to its thickness and directs it to the ejection chute and then to the classification bin.



As each piece is gaged, an electric impulse passes through a commutator hav-

NOTCHING TUBING OR PIPE ENDS EASILY WITH

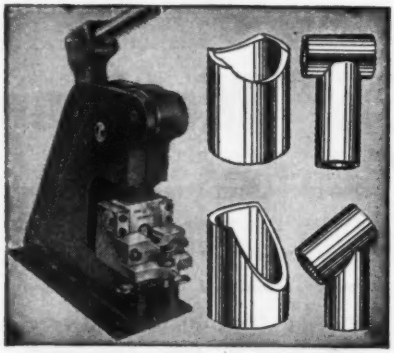
ARC-FIT

Patent No. 2,126,519

IN POWER PRESS OR HAND PRESS

Arc-Fit is a notching unit for preparing pipe or tubing ends in making welded or brazed tubular joints. Arc-Fit will prepare the ends of a pipe or tube in less than 5 *seconds*. Arc-Fit is a production tool that will cut your production costs. It is applicable in any industry where pipe or tubular construction is used.

- Arc-Fit can be utilized in any power press.
- Arc-Fit can be furnished for any size tubing or pipe.
- A hand press can be supplied with Arc-Fit units for shearing pipe or tubing sizes 2 inches or under.



- For sizes over 2″, angular cuts other than 90°, and slotting operations. Quotation furnished on request.
- Arc-Fit does not deform pipe or tube. No grinding or finishing operation is needed.
- Engineers can now design for tubular construction and cut costs.

Write today for circular and prices.

Manufactured Exclusively by

VOGEL TOOL & DIE CORPORATION

2525 Moffat Street Chicago 47, Illinois

ing 32 size classification segments, and pre-aligned, the new unit insures a mechanism. Only one set of masters, a minimum and a maximum, is needed to adjust the gage. Individual increment settings, adjustments and tuning are not required.

Ward Leonard Chrome Plating Process

The normal life of most cutting tools and wear parts can be multiplied from 3 to 10 times by a new industrial hard chrome plating process embodied in the Model A-20 Chromaster introduced by Ward Leonard Electric Co., Industrial Chrome Division, 31 South St., Mount Vernon, N.Y.

The Chromaster provides production industries with complete facilities for hard chrome plating metal surfaces up to 10 square inches at the recommended current density of 2 amps. p.s.i. The unit is compact and completely portable.

Powered by a dry disc, power pack, selenium rectifier, the Model A-20 Chromaster is complete with plating bath tank, heavy duty rheostat, timer, ammeter and reversing switch for stripping action. The hard chrome deposition can be controlled to tolerances of less than 0.0001" with the Chromaster.

Operating at room temperature, Chromasol is a new, non-critical chrome plating solution shipped to the user in a liquid, concentrated form. Chromasol delivers a hard chrome plate that follows the exact characteristics of the base metal to which it is applied. The rate of deposition remains constant at 0,002" per hour.



Using this process, 1½ minutes is the average time required to hard chrome cutting tools and wear parts and fortify them against chip-loading, galling actions and heat wear.

THE NEW REVERSIBLE

EXCELSIOR CIRCULAR BENDING MACHINE No. 14-R

ROLLS PART OR COMPLETE CIRCLES

PRODUCTION CIRCULAR BENDING

OF

ANGLES, LEG IN OR OUT FLATS, PIPES, ROUNDS, SQUARES, TEES, CHANNELS

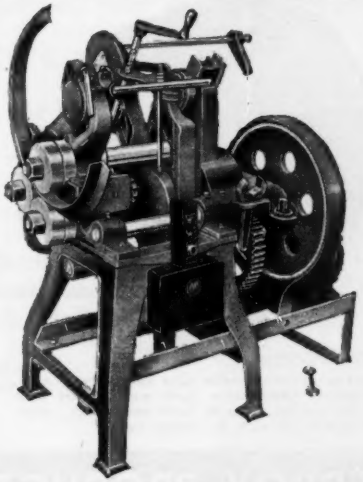
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EXCELSIOR TOOL & MACHINE COMPANY, EAST ST. LOUIS, ILLINOIS

Williams Punch and Die Making Machine

The Connecticut Tool & Engineering Co., 544 Iranistan Ave., Bridgeport 5, Conn., announces its new Model F-3 Williams Punch and Die Making Machine, superseding a previous design. This unit, which is used for final finishing operations on metal stamping or power press punches and dies, and also on dies for extrusion metals, contains new features for ease of and speed in operating.

The illustration shows the new streamlined construction using a ½ h.p., 1800 r.p.m. Axial Air Gap Motor. The flange on the base receives other standard horizontal shaft motors. The variable speed transmission is fully enclosed, operated from a convenient dial and handle to provide from 75 to 350 strokes per minute of the operating shafts suitable for all grades of steel. A new main drive mechanism using a segment and gear control and a throw-out clutch eases the stroke adjustment for the operator.

A foot pedal device gives instant control of operation. The machine retains such exclusive features as a compound tilting table with vernier scale reading; 5″ stroke and table adjustment; a heavy



17″ diameter counter-balanced table; air pump and piping; adjustable lights; attachments for light and heavy compression and tension files; holders and guides for fine or jewelers' saws, etc.

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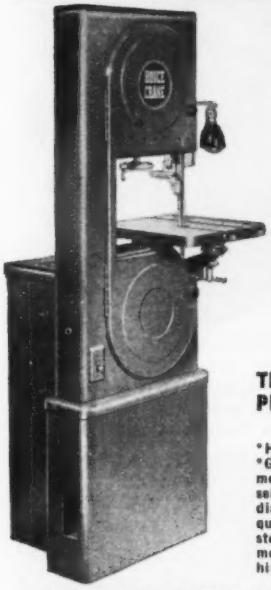
Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Now aiding thousands of workers, the Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. $10.50.

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COMBINATION CONTOUR SAW AND BAND FILER!
CUTS ● FILES ● GRINDS



Produces maintenance parts, short run production parts, metal templates, special wrenches, wrench templates, cams, spiral parts, irregular shaped stacked parts, and stamping, forming and trimming dies in minutes instead of the hours required by old methods involving milling, shaping and hand filing. Does precision filing, file broaching and flash removal in one-ninth the time required by hand and one-fourth the time required by reciprocating filing machine.

*Solid welded steel frame. *15" x 15" ribbed cast work table. *Improved guide design sharply reduces blade costs. *Handles blades 3/16" to ¾". *File bands come in ¼" and ⅜" widths, two shapes, six cuts. *8 speeds, from 92 to 4100 blade f.p.m. Chart, mounted on machine, shows correct speed for accurate inside, outside and contour sawing of all industrial materials.

★ ★ ★ ★

THE ONLY HEAVY DUTY 15-INCH DRILL PRESSES WITH ⅝-INCH DRILLING CAPACITY — THE BOICE-CRANE SERIES 2600 —

*Heavy box-type helmet head. *50% thicker column. *Guaranteed closer tolerances wherever it counts. Much more accurate than ordinary 15-inch drills "built to sell at a price." *20% larger quill, actually 2 1/16" dia. *Up to 50% more bearing against side thrust on quill when deep hole drilling and routing. *Rugged steel (not die cast) 6-tooth splined drive sleeve. *Far more sensitive, powerful quill feed. *Quick acting hinged belt guard.

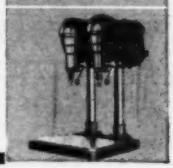
Boice-Crane doesn't try to build the cheapest—but rather the finest intermediate capacity tools at a price only slightly more than that of less accurate, limited capacity, flimsily-built machines.











50 HIGH & SLOW SPEED BENCH & FLOOR MODELS; 1-2-3-4 SPINDLES

*5 speeds—25% greater range. Easy speed changing. *Various options on work tables. *Heads and parts sold separately for special setups. *Full line of accessories, tapping heads and foot feeds.

Boice-Crane also offers a 15-inch light duty drill press line in 12 models at a popular price.

Prompt Delivery Through Industrial Supply Distributors.

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Please send ( ) Boice-Crane Drill Press Catalog; ( ) Boice-Crane Band Filer Brochure; ( ) Boice-Crane Woodworking Power Tool Catalog.

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Landis Hydraulic Piston Grinding Machine

The new 5"x8" Type H Hydraulic Piston Grinding Machine introduced by Landis Tool Co., Waynesboro, Pa., is developed for accurately and economically grinding the cam shaped skirt portion of automotive pistons. The maximum capacity of the machine is 5" diameter pistons with a maximum length of 8".

One of the features of this machine is the fact that it can be arranged to operate on a semi-automatic cycle.

The standard wheel is 24" in diameter with a 3¼" face, driven by a 7½ h.p. motor. This facilitates grinding of pistons by the plunge grind method with a wide wheel. It may also be arranged for traverse grinding of pistons. When traverse grinding, there is an automatic feed at each reversal of the traverse until the piston is completed to finish size. When using a plunge grinding cycle, the feed is continuous until a predetermined size is reached, at which time the feed will stop. A reciprocating mechanism is used to reciprocate the wheel for fine finishes. It may be adjusted for amount of reciprocation and disengaged when not needed.

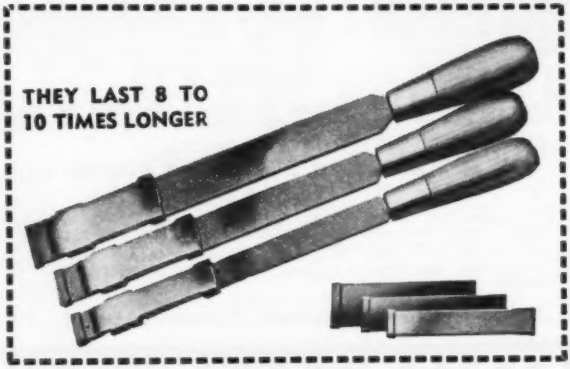


An overhead, hydraulically operated wheel dressing mechanism may be provided so that the grinding wheel can be dressed without disturbing the grinding set-up.

CARBOLOY TIPPED SCRAPER BLADES

●

Available in three widths



Especially good for hard alloy iron and extremely hard bronze castings. If you are using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades. Simply remove high-speed blade and slip in the Anderson Carboloy Tipped Blade.

ROCKFORD Anderson BROS. MFG. CO. ILLINOIS

Write for Bulletin No. 3-5

ANDERSON BROS. MFG. CO., Rockford, Ill.

Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses.

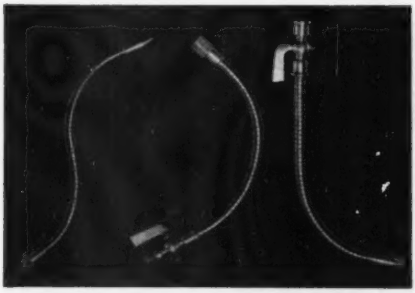
The H Type Piston Grinder is provided with a new design headstock of the live spindle type with V-belt drive for smooth, even transmission of power to the headstock spindle.

The piston grinding unit has a rocking action which is necessary to obtain the cam contour on the skirt of the piston. A new type tapered master cam is used so that the difference between the two axis of the skirt can be varied as required.

The work drive motor is 1 h.p. Plug braking is used to stop the spindle rotation quickly for loading of the work pieces.

Adjustable Coolant Spouts

Coolant Spouts that stay put without support, and that are adjustable to any position by the touch of the hand, are announced by the J. N. Fauver Company, Inc., 49 West Hancock St., Detroit, 1, Mich. The spouts will stay in place continuously regardless of the machine vibration or volume of coolant flow. The devices are built by machinery that is designed to make the product completely leakproof and adjustable to any machine tool.



These "Bullseye" Coolant Spouts feature elimination of leaky pipe joints and swivels clear of burrs without hazard to hands. They permit an unrestricted flow of coolant, allowing lower controlled pressure with little splatter and coolant waste.

These Coolant Spouts are supplied with fittings in many suitable combinations; they are fitted with nozzles, and with male or female couplings; stopcocks and unions are carried in stock. Combinations available: male and female, male and male, male and nozzle, female and female, female and nozzle. Sizes: standard diameters (I.d.): ⅛". ¼", ⅜", ½", ¾"—pipe thread always corresponds with tube i.d.



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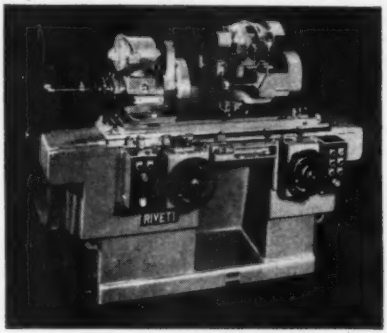
386 PUTNAM AVE. CAMBRIDGE, MASS.

Rivett Universal Hydraulic Grinder

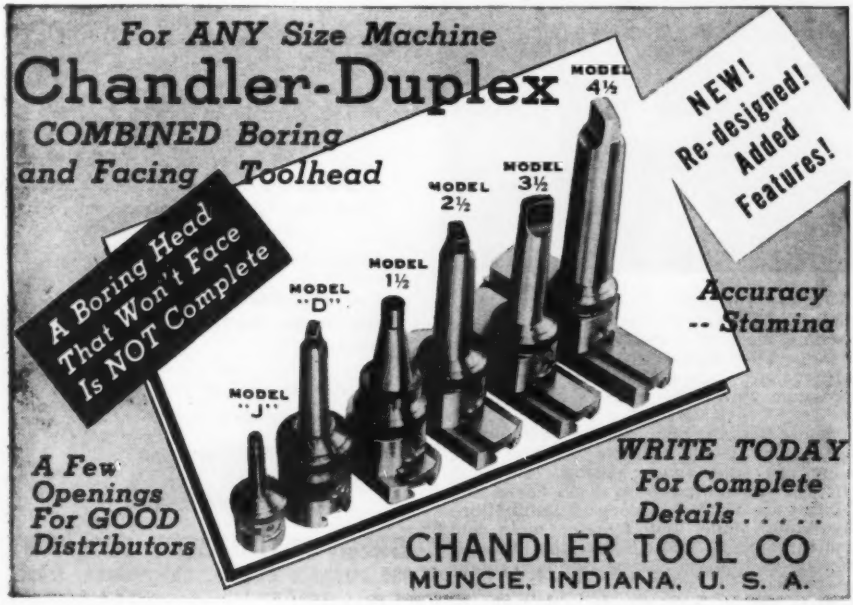
A universal wheelhead features the new 1024 hydraulic grinder recently offered by Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Mass. Swiveling 180°, and mounting both internal and external spindles, the wheelhead is designed to eliminate dual work set-ups for internal and external grinding. The operator can quickly present either spindle to the same work.

The new Rivett grinder is constructed to perform all types of grinding: internal work includes small, large and deep-hole grinding; external work includes straight shaft, long shaft; diameter and shoulder grinding. A feature providing added accuracy and speed is the mounting of draw-in collets and step chucks directly in the lathe type workhead and the operation of a lever closer to reduce chucking time.

Other features include internal spindle speeds from 6000 to 35,000 r.p.m.; all spindles are flange mounted, sealed from grit and life lubricated; external spindle with double-row roller bearings for radial load and ball bearings for end thrust, pre-lubricated for life is designed to permit maximum rigidity, with no adjustment required; a micrometer table stop and fine feed for shoulder and blind-hole grinding; a sine bar for setting the workhead on the table swivel for perfect tapers; double swivels on the



cross slide for two angle internal and external grinding; all grinding wheel feed controls are at the operator's right hand—all table traverse controls at operator's left hand.



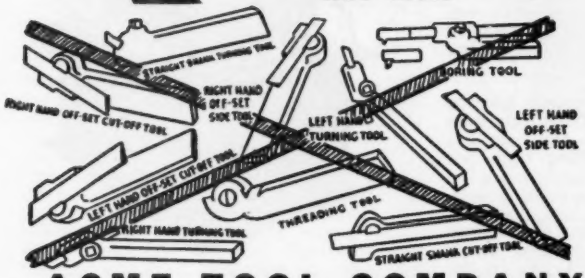


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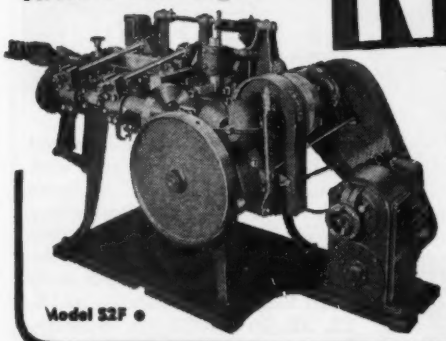
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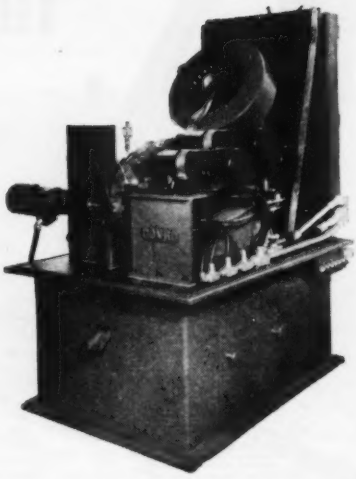
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Automatic Wire and Metal Forming Machines • Staple Forming Machines • Chain Making Machinery • Foot and Power Presses • Wire Reels • Wire Straighteners.

SPECIALISTS IN WIRE FORMING EQUIPMENT FOR OVER 50 YEARS

Machine for Automatic Drilling of Cotter Pin Holes

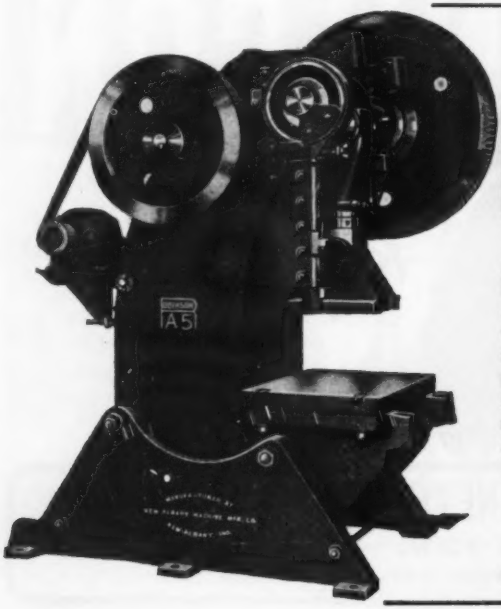
A new type of machine for speeding up the drilling and countersinking of cotter pin holes in clevis pins and screws has been announced by the Govro-Nelson Co., 1933 Antoinette St., Detroit 8, Mich. It performs the operations of drilling the hole and countersinking both sides at the rate of 1500 pieces per hour.



The machine is fully automatic, employing four model KH Govro-Nelson Automatic Drilling Units which operate simultaneously in conjunction with and completely interlocked with a Geneva type, 8-station indexing dial and a hopper part-feeding mechanism.

The part is first countersunk on one side by one drilling unit. Two units then accomplish the drilling in two stations, thereby reducing the drilling time per piece. The part is then countersunk on the other side by the fourth drilling unit.

The machine is so designed that it will stop automatically, should a tool break or should a malformed part jam in the mechanism, and it will slow down automatically in case a tool becomes extremely dull. The indexing mechanism cannot operate unless all of the tools are out of the work. Similarly, the drilling units cannot operate during the indexing.



INCLINABLE PUNCH PRESSES SERIES A

ROBINSON

A-5 Motor Drive 88 Ton Geared Inclinable Punch Press with Anti-Backlash Brake to take care of kick back when using air cushion and heavy spring pressure pads. Timken bearings in clutch wheel and back shaft bearings. Available in 14, 22, 32, 56 and 88 ton capacity. Literature on request.

New Albany Machine Mfg. Co.

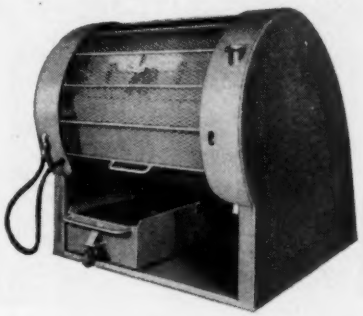
New Albany, Ind.

Grav-i-Flo Tumbling Machine

A tumbling machine designed with an increased capacity for grinding, deburring and finishing metal parts is introduced by the Grav-i-Flo Corporation, 400 Norwood Ave., Sturgis, Mich. The new machine has a 5′ 8″ width x 5′ 4″ depth x 5′ 8″ height. With its two 24″ x 40″ i.d. compartments, it is rated to handle a 30% larger work load than comparable machines occupying the same amount of floor space.

Other outstanding features include compartments furnished with ½″ plate unlined, or ¼″ plate rubber-lined; doors have cam locks with manually released safety stops to provide pressure relief; the magnetic starter has a reduced voltage control to meet plant electrical standards (a lever is standard on the machine, but a push button switch is optional). A limit switch on the safety guard cuts off current to stop barrel rotation when the guard is lifted. The 220-440 volt, 5 h.p. motor has a magnetic brake. Water and electrical services are integral with the machine and available for instant, convenient connections.

Other equipment available for the Grav-i-Flo tumbling process are Grav-i-Flo Super-Brite finishing chips, rated to cut 25% faster on non-ferrous metals, and which eliminate such subsequent



operations as ball burnishing; Grav-i-Flo compounds, which change chip surface from finishing to cutting in minutes, thus eliminating the need of transferring parts from the cylinder; Grav-i-Flo natural and synthetic de-burring chips for all metal alloys.





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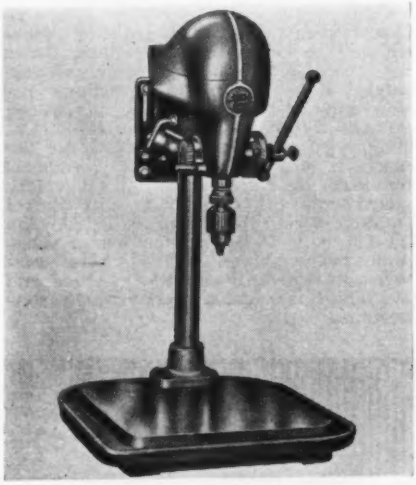
Machinists prefer durable "De-Sta-Co" steel Arbor Spacers and Shims for milling, slitting and gang-saw setups and for shimming gears and bearings. YOUR SHOP SAVES, too, when each machine has two sets handy for speedy setups. Ask your mill supply house for them by name, "De-Sta-Co", or write for Spacer and Shim Stock Price List.

DETROIT STAMPING COMPANY

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"Darra-James" 12" Drill Presses

Toolkraft Corporation, Springfield 1, Mass., announces its new 'Darra-James" improved 12" light-duty drill presses. These new units are offered in three models, No. 352, a two-spindle unit mounted on a 17¼"x26" production oil table with heavy braced cast iron legs; Model No. 353, a bench type two-spindle unit; and Model 354 (illustrated), a single spindle unit with a 17¼"x15" oil table.



These 12" drill presses are the first of a new series of Toolkraft Industrial type power tools to meet the demand of the mobilization effort.

Both the single spindle and multiple-spindle units are provided with the Toolkraft 350A heads with a new rotary type quick action stop regulator. Individual job set-ups can be marked on the face of the rotary stop indicator. Graduations of 1/16" are also etched on the face of the quill. Plastic knobs have been added to the pull-down lever. Atwood auxiliary shelf on the Model 352 is provided for tools and jigs.

These units permit drilling to the center of a 12" diameter circle. The spindle is ⅝" ground steel; spindle travel is 3". A No. 33 Jacobs chuck has a capacity of from 5/64" to ½". Seven speeds are provided, with a range of 700 to 4300 r.p.m. Recommended motor for these units is a 1/3 h.p., 1725 r.p.m. ball bearing type.



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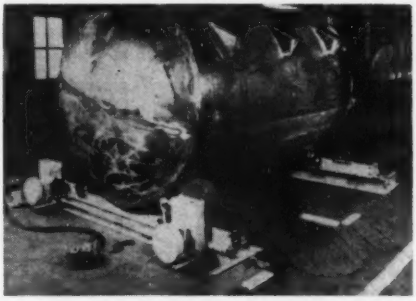
MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.

Aronson "Trac Tred" Turning Rolls

A turning roll designed for cradling light gauge tanks has been introduced by Aronson Machine Co., Arcade, N. Y. The new device, called the "Trac Tred" Turning Roll, is stated to have from 68° to 105° uniform contact throughout the bottom side of the tank, eliminating the possibility of the tank's buckling or denting. The turning roll is provided with maximum traction in order to hold an unbalanced load. It has instant power, free wheeling and instant braking, according to the manufacturer.

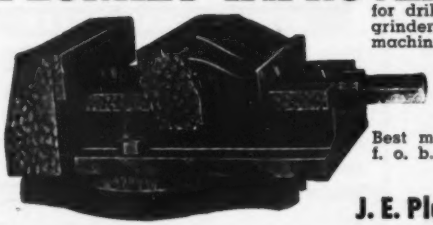
This endless belt type turning roll is constructed with a jack screw actuating one end of the powered and idler units, which adjusts according to the size of the tank. Only 4" travel on a steel dovetail is required for tanks from five to ten feet in diameter.

The "Trac Tred" is provided with an infinitely variable speed drive with speeds from 0 to 100" per minute, accomplished through Graham Transmission. A dual clutch, one on either side of the power unit, is actuated by solenoids. One end of the unit is driven at a time, thus keeping the roller chain track tight on the bottom of the tank. A reversing switch energizes each clutch individually. With the switches in "off" position, the tank may be rotated manually.



Brass feet can replace every fifth rubber foot of the turning roll for grounding the tank through the machine. Covers enclosing the motor, speed reducers and clutch mechanism are standard equipment. A 12-foot remote control station is also included.

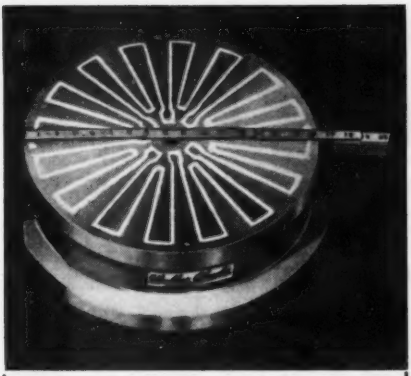
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In ordering this vise give size of slot in table:
No. 10—6" jaws, 1½" deep, opens 5" wt. 45 lbs. $68.20
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75 Various Model and Fixture Sizes

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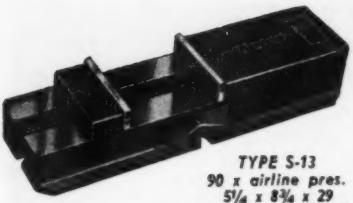
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Five senior models. Many special-purpose construction. 50 to 200 times airline pressures. *Write for data sheets* • Wedge-&-lever action utilizes total cylinder drive. Pat'd. Exceptional rigidity particularly suited to work-holding on CARBIDE MILLING, and almost all milling operations.

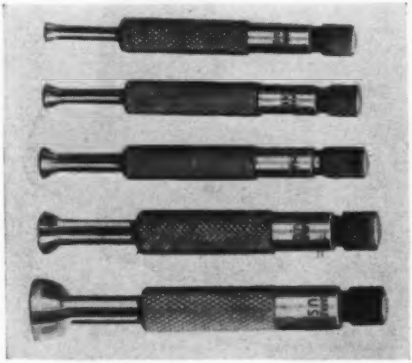


TYPE S-13
90 x airline pres.
5¼ x 8¾ x 29
Max. jaw opening 12"

production devices, inc. Whitehall, New York

Starrett Short Type Small Hole Gages

Designed for measuring holes, slots, grooves and recesses ranging from .125" to .500" which are too small or shallow for the conventional telescoping gage, these new Small Hole Gages (No. 830) have the added convenience of extra short length. These useful tools are a recent development of The L. S. Starrett Co., Athol, Mass.



The gaging surface is formed with a flat bottom, permitting use in the shallowest holes, slots and recesses. These gages are adjustable to size by means of a convenient knurled knob at the end of the gage which provides a smooth and sensitive adjustment and feel. When used with a micrometer, the size of any hole or slot may be obtained in thousandths or ten-thousandths of an inch. These gages are available in five sizes covering a range of .125" to .500" and may be secured singly or in sets.

Boring Tool Provides High Accuracy

The Maxwell Company, 220 Broadway, Bedford, Ohio, has the improved design of their standard E-Z Set boring tools in order to facilitate set-up, increase accuracy and assure maximum ease of operation. The new improvements include increased tool rigidity through the incorporation of larger dove-tail areas; ground fit male and female dove-tail; micrometer-like adjustment which facilitates accuracy to within 0.0002-inch; and

TO INCREASE PRODUCTION AND TO IMPROVE EFFICIENCY USE

BUTTERFLY FILING AND DIE MAKING MACHINES

This is a powerful machine for heavy or small precision work in use all over the world: Airplane Factories, Aluminum Plants, Toolrooms where fast production is desired. 4 Models, No. 16, No. 14 "EL" and Model "D." The larger the Model, the bigger the stroke and therefore more filing is performed. Furnished with or without pedestals

Constructed as per specification of U. S. Naval Aircraft Factories.

HARVEY MFG. CORP.

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BEWARE OF IMITATIONS

Our machine carries the Butterfly trade mark.

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THE CRALEY OFFSET BORING HEADS

Offset boring heads, made in nine sizes, have minimized overhang and easily read calibrations. The boring bars go to the bottom of the dove-tail bearing to make short set-up. Tension screws are on opposite sides and ends of block, so that all cutting strain is thrown against solid metal.

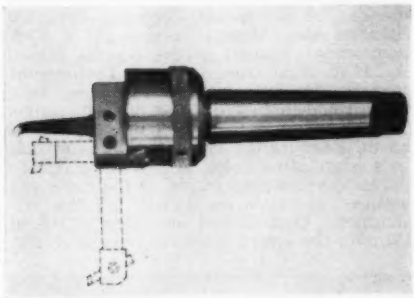
C. C. CRALEY MFG. CO.

SHILLINGTON PENNSYLVANIA



the elimination of distorting slots or gibs.

The improved boring tools are made of chrome-nickel-molybdenum and nickel-molybdenum alloys. They are smooth and circular in shape to assure maximum safety of operation and ease of handling.

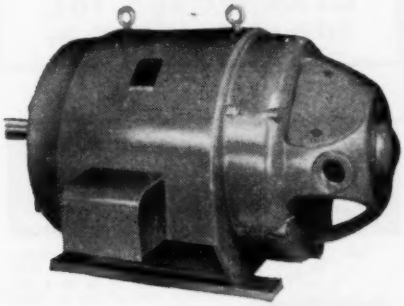


A further improvement is the change from steep angle threads on the scroll mechanism to modified square type threads which are said to reduce backlash to a minimum and augment tool rigidity and accuracy.

Heavy-Duty Wound-Rotor Motors

Electric Machinery Mfg. Co., Minneapolis 13, Minn., announces a new line of heavy-duty, wound-rotor Induction Motors which provide variable speed drive, and are also said to be advantageous on applications requiring high starting torque and low starting current, or long acceleration periods.

Pictured below is a 200 horsepower, 1750



r.p.m., E.M wound-rotor Induction Motor. Built in ratings from 30 to 1500 horsepower, drip-proof construction are fur-

WALTHAM CYLINDRICAL SUB-PRESSES

Dies for high precision work should not only be perfectly aligned but provision should be made to maintain that alignment throughout the life of the die. Our bulletin shows how it can be done.



ARCH SUB-PRESS

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TOOL BITS
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REVOLVING STOPS
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Inasmuch as we manufacture cams and tools for the trade we obviously do so on a production basis. As a result we offer:
1. Superior type tools . . . at low cost.
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3. Correct specifications which insures maximum service.

Your tool requirements in our hands is your guarantee of better tools at a great saving.

SERVICE

Let us quote on your tool requirements. You'll save money . . . even as compared with "home made" tools. Standard circular form tools for B&S and Davenport Machines carried in stock. Immediate delivery.

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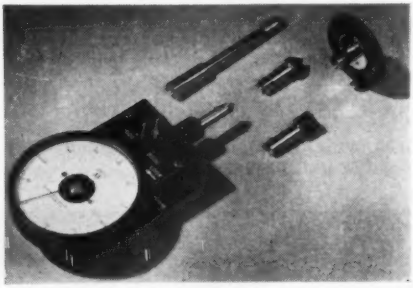
GEORGE L. DETTERBECK CO. Incorporated, 3871 Clybourn Ave., Chicago 14, Ill.
ENGINEERS TO AN INDUSTRY

nished as standard; splash-proof or enclosed, forced-ventilation, models are also available. The heavy-duty, fabricated steel frame features high physical impact strength and crack-proof steel-bar feet, say the manufacturers.

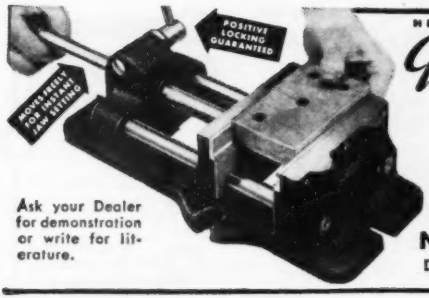
These motors are available with either ball or split-sleeve type bearings to provide long wearing qualities, and are easily accessible for inspection and maintenance. Superfinished journals on split-sleeve type bearings provide a highly friction-free surface. Brush pressure is easily adjusted with a ratchet wheel brush tension adjuster which provides metered step-by-step increase or decrease of pressure on the individual brushes. Finger-tip removal of cover plates permits a large opening for easy access to the brushes and for ease of cleaning.

Equipoise Hand Tachometer

A new dual range Hand Tachometer has recently been introduced to the American market by Equipoise Controls, Inc., 100 Stevens Ave., Mount Vernon, N. Y. This instrument, known as the Smiths Model A.T.H.10 dual range Hand Tachometer features an extremely low torque, only 0.40 ounce-inches on the lowest range. The ranges are 0-1000 r.p.m. and 0-5000 r.p.m. Each range is printed on the dial in a contrasting color. A revolving Alnico permanent magnet inside of the drag cup assures extreme sensitivity of the instrument. Guaranteed accuracy of 0.5 of 1% over the entire scale range is provided.



The instrument is equipped with a knurled knob for range selection and a push button on either side of the instrument for releasing and holding the pointer at the machine speed indication. The tachometer is provided with a fabricoid carrying case, complete with male and female centers, and a 3½" extension and 6" circumference surface measuring disc.



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NATIONAL MACHINE TOOL CO.

DEPT. 101-C • RACINE, WISCONSIN

Trico Gravity Feed Oilers

A new line of gravity-feed oilers has been introduced by Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12, Wis. They are available in 10 oz., 1 pint, 1 quart and 2½ quart capacity, Pyrex glass or Lucite plastic reservoirs. The oilers may be equipped either with lock ring or ratchet feed adjustment. They are designed to feed any predetermined number of drops per minute.

These oilers are recommended for applications on large stationary bearings, machinery, journals, conveyor drive chains, etc.; wherever a large quantity of oil is required or when it is desirable to extend reservoir refilling time for as long as possible.

The rate of feed is obtained by regulating a simple needle valve control. The setting is firmly locked in place. When the shutoff lever at the top of the oiler is in upright position, the oiler feeds at the set rate. When the lever is flipped to the side, the oil feed stops. Held at a 45° angle, it flushes the bearing a desirab'e feature when starting machines that have stood idle.

Oilers are provided with Pyrex glass or Lucite plastic sight feed fittings, with standard threads for mounting directly on top of the bearing or part to be lubricated; they are also available with lock-nut on sight fitting for tightening



to mounting bracket and with a compression fitting for connection to copper or Neoprene tubing. All metal parts are reinforced and silver-alloy brazed to provide one solid, non-leaking unit.

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REAMERS are also furnished in Right-hand spiral, right hand cut, as well as Left-hand Spiral, Right-hand cut.

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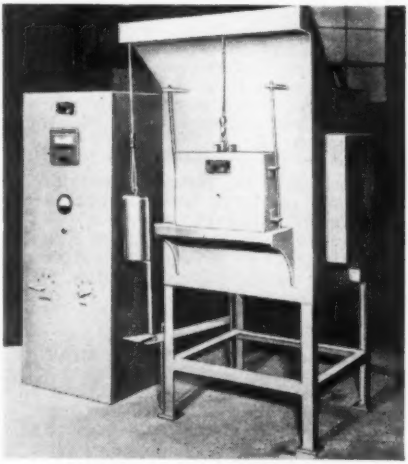


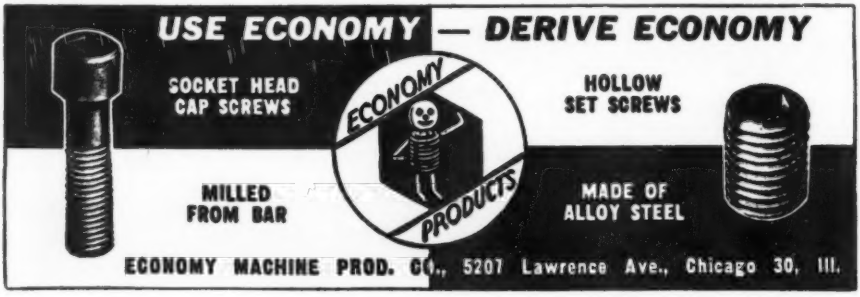
Pereny Heat-Treating Furnaces

To match the need for single units that do the work of multiple equipment over the full range of heat-treating temperatures, Pereny Equipment Co., 893 Chambers Road, Columbus 12, Ohio, has introduced the new Pereco "FG" Series Electric Furnaces in various load capacities. These general purpose units, equipped with Globar heating elements, are designed for heavy and continuous duty at all heat levels up to 2500° F., with higher temperatures available for short or intermittent runs.

Each of the furnaces has a separate, matching control panel unit, complete with indicating controller, transformer, current input meter with pushbutton reading, and magnetic contactor. To further extend coverage of the new series to special applications, a wide choice of standard makes or types of control (recording, program or cycle, excess temperature, etc.) are also available.

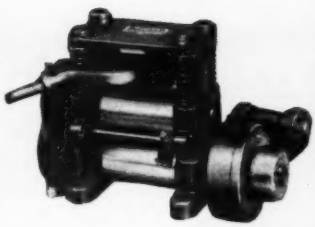
The voltage regulating type transformer with 36 taps on multiple dead-front switches maintains a constant rate of heating. This is said to provide broad flexibility of operation since it makes available a wide range of voltage "turndown" for low temperature work. Maximum connected load of the "FG" furnaces range from 9 KW to 50 KW.





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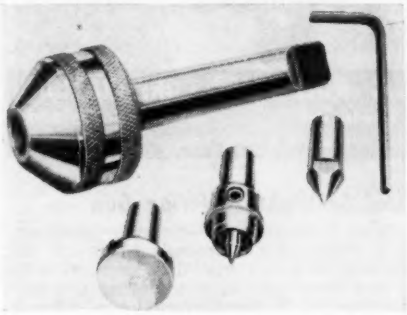
LA BAHN MACHINE & MFG. CO. Dept. HJ Metuchen, N.J.

The heavy steel, electrically welded, furnace case is gas tight and has thick, heavy-duty type insulation. Loading areas in the several models of this new series range from 8″ wide, 10″ deep, and 4″ high, to 16″ wide, 30″ deep, and 12″ high. Within the work chamber, the entire surface of the U-shaped silicon carbide hearth is exposed evenly to the heat. Properly positioned above and below this hearth, for maximum, uniform heat transfer, are the non-metallic (silicon carbide) heating elements with air-cooled terminals. Since each of these rod-haped elements extends completely through the furnace, they are easily replaced after long usage without unloading or otherwise disturbing the furnace.

Delta Ball Bearing Center

In a series of gruelling test applications, the No. 1490 Delta Ball-bearing Center outlasted four similar units, according to engineers of the Delta Power Tool Division, Rockwell Manufacturing Co., 600 E. Vienna Ave., Milwaukee 1, Wis.

Delta engineers describe the center as being free of chatter. They credit its ability to "take it" to its rugged, simple construction. It has a double row of sealed, lubricated-for-life ball bearings, to take exceptionally heavy radial and thrust loads. It is accurate and runs true, because the center socket is drilled and machined after assembly.



The Delta Ball-bearing Center is designed to be used on lathes, grinders, screw machines, gear hobbers, and similar machines. The unit is supplied with three replaceable centers and a wrench. The shank has a No. 2 Morse Taper.

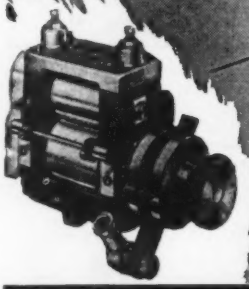
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Deep Holes—Exclusively

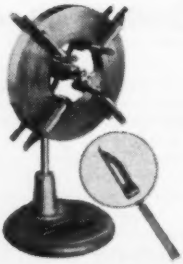
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THE "RFC" MODEL 2 STOCK REEL
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Quick acting clamps for speedy positioning without bolts or screws.



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Dual Spotlight Soldering Gun

Dual spotlights to eliminate shadows, and over-under terminals to brace the tip and improve visibility, are features of the new light-duty soldering gun announced by Weller Electric Corp., Easton, Pa. This new model is smaller and lighter



than previous (now obsolete), 135 watt guns, and yet is stated to have substantially greater soldering capacity.

The new gun also combines other advantages that make it useful to radio and TV technicians, automotive mechanics, electricians, laboratory workers, etc.

These advantages include dual heat (100/135 watts) for all light and delicate soldering; 5-second heating to save time and current; a trigger-switch control which adjusts the heat to the work and eliminates need of unplugging the gun between jobs; the chisel-shaped "Weller-tip" for faster heat transfer and speedier soldering.

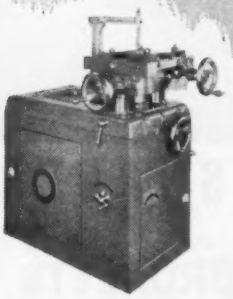
Di-Acro Vari-O-Speed Powershear

The new Di-Acro Vari-O-Speed Powershear introduced by O'Neil-Irwin Manufacturing Co., 314 Eighth Ave., Lake City, Minn., is said to offer a new theory in the high speed production shearing field. Its design and construction provide full capacity continuous shearing within its entire speed range of 30 to 200 r.p.m.

The cutting cycle of this unit can be adjusted to the fastest speed at which the operator can feed the material for any given shearing operation, thereby providing maximum operator productivity. The necessity of engaging the clutch for each cutting stroke has been eliminated. The speed of the shearing stroke for both continuous and single cycle

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Cut time and costs with the ELECTRIX PRECISION DIE MILLER . . . for milling inside and outside shapes such as blanking dies, draw dies etc. Complicated outlines can be milled in minutes . . . not hours. Write today. No obligation.



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operation is positively controlled with the speed control handle located at the operator's left. A U.S. Varidrive motor is incorporated in the construction of the new Di-Acro Powershear; the motor can be quickly adjusted for the exact shearing speed required for each cutting operation.

A non-repeating positive safety clutch, which allows "single stroke" operation with the shear blade moving at any desired speed within the entire range of the unit is also incorporated in this machine. The slow shearing speeds which are possible provide a sensitive and smooth shearing action for cutting delicate and unusual types of materials which do not react favorably to the "impact" type of shearing.

The cutting range of the Vari-O-Speed Powershear extends from the lightest plastics, fibre, mica, leather and rubber to heavy gauges of aluminum, cobalt steel, chrome molybdenum, leaded brass, stainless steel and many spring tempered materials. In all these materials, a clean cut free from rough edges or burr is assured, the manufacturers state.

The Vario-O-Speed Powershear is also useful for specialized shearing applications in industries outside the metal-working field, and its ease of operation makes it adaptable for women operators. Both the design and operating convenience of the machine is enhanced by a



knee hole at the front of the cabinet which provides comfort for the operator and allows close observation of the work.

Microsyn, A Precision Regulator

A new type of regulating device, known as the Microsyn, is being produced by Westinghouse Electric Corporation, Pittsburgh 30, Pa. It is said to be superior to step regulators in that it provides regulation in infinitesimal steps. It is also more sensitive and accurate than devices of the Synchro-tie or selsyn type. The basic idea for the microsyn originated in the Instrumentation Laboratories of the Massachusetts Institute of Technology.

The microsyn can do three kinds of things: (1) it can produce a voltage proportional to turning a rotor over a range of plus or minus ten degrees, with a sensitivity of 20 seconds; (b) it can produce a torque that is linear with the square of a signal current; and (c) it can act as an elastic restraint generator, producing a torque proportional to the product of the square of a current and the angular displacement.

The microsyn consists of a moving element in a four-pole field; this is not new in itself, but because of its precision construction, new things can be done with it.

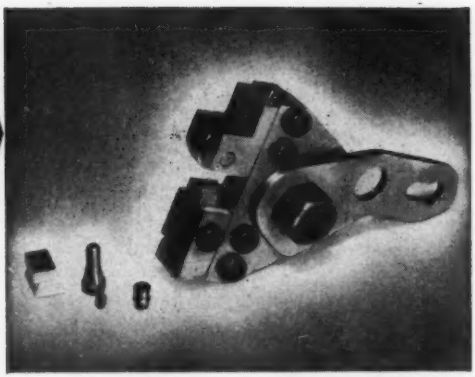
The magnetic structure is of Hipernik specially processed to give a hysteresis loop of small area, and a permeability of 100,000 with 0.03-oersteds coercive force.

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WITH THE LITTLE SHAVER

The LITTLE SHAVER, designed for operation on Brown & Sharpe automatic screw machines, is adapted to standard tool holders in the same manner as a circular form tool. Sturdy, compact and simple in adjustment, the LITTLE SHAVER with standard or special formed tool and roll is the answer to your close tolerance problems all day long And LITTLE SHAVER is inexpensive, too!

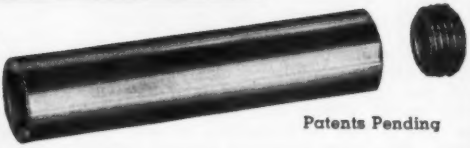
Send for complete information and prices. Consult us for special cutting tools of all kinds, including carbide.

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NEW BRITAIN, CONN.

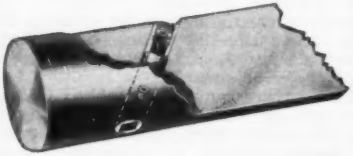
How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. The hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.



Patents Pending



BUSHINGS MADE IN FOLLOWING SIZES:
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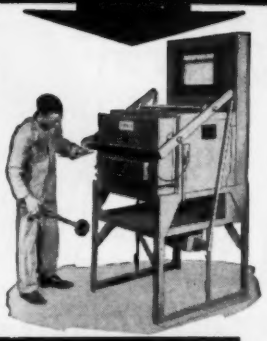
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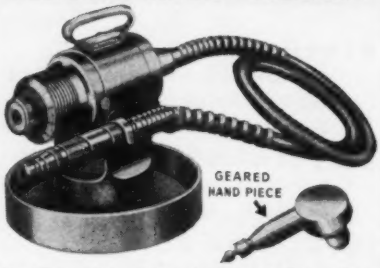
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- Large, easy-to-read graduated dial.
- "V" tool block, hardened, ground.

A model for practically every tool room and production operation.

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FLEXIBLE SHAFT MACHINE



Used for a wide variety of work; grinding routing, carving, filing, burring, buffing, polishing, sanding and wire brushing. It is very useful for making wood and metal patterns, dies, tools and also in regular manufacturing work.

The 1/3 h.p. motor operates on 110 or 220 volts — a.c. or d.c. current. (Specify voltage when ordering) and gives speeds up to 10,000 r.p.m. By using the "geared hand piece" these speeds may be extended to 23,000 r.p.m.

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10" Length x ½" wide x 18-24-32 teeth. $2.25 doz. - $25.00 gross

Manufactured in England from the Finest Sheffield High Speed Steel

Sold with a Money Back Guarantee

SID TOOL CO., INC.
126 Lafayette St. New York 13, N.Y.
CUTTING TOOL SPECIALISTS

Zip-Grip Self-Locking Set Screw Demonstrator Model

An oversize (4"x6") cardboard set screw demonstrator, which clarifies and demonstrates the "contra-thrust" action and the three-way locking principles embodied in the Zip-Grip self-locking set screw design, is offered by the Set Screw & Manufacturing Co., Bartlett, Illinois.

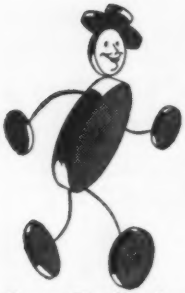


The demonstrator makes clear the essential differences between the action of the conventional type set screw and the self-locking action of Zip-Grip. According to the company, "The demonstrator has been developed to eliminate confusion and misunderstanding of our basic three-way locking action, which, while it utilizes interference fit, relies principally upon a "contra-thrust" action for results. As the demonstrator shows, this self-locking action is obtained without defacement of the set screw or tap, and can, therefore, be used over again just as many times as a conventional set screw or adjusting screw."

The demonstrator is constructed of heavy cardboard. It includes replicas of a conventional set screw (on orange board) and a Zip-Grip (on yellow). The main section consists of a 4x6" card incorporating a slot in the design of a No. 2 tapped hole, such as is used for conventional set screws and also for the Zip-Grip, as the latter requires no special tapping. The demonstrator model is available upon request to the manufacturer.

WHEN ACCURACY COUNTS...
Contact SCHERR!
TOOLMAKERS MICROSCOPE
FOR COORDINATE MEASUREMENT 4"x 2" AND PROTRACTOR OCULAR IN MINUTES • TEMPLETS FOR ALL STANDARD THREADS • Smaller and Larger Sizes suitable for all shop requirements available
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Roto-Master Hi-Speed grinder makes carbide roughing and finishing available to every shop. Designed for operations requiring precise "finger-tip" control, in conjunction with carbide burrs and mounted wheels from 1/8" to 1/4" dia.
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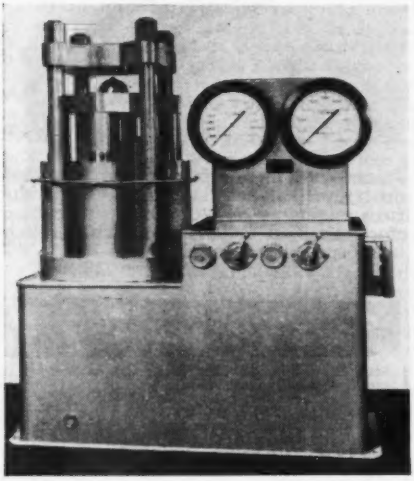
• Other size machines also available. *Write for Bulletins*

SAN ANGELO FOUNDRY & MACHINE CO.

San Angelo, Texas . . . . . **1000 E. Upton**

Steel City Ductility Testing Machine

A new ductility testing machine providing a total capacity of a quarter of a million pounds pressure and incorporating a unique 5" diameter penetrator has been made by Steel City Testing Machines, Inc., 8843 Livernois Ave., Detroit 4, Mich., for the Fontana Works of the Kaiser Steel Corporation. Purpose of the unit is to detect surface and sub-surface imperfections in deep-drawing steel over a comparatively large area.



The machine is motorized, hydraulically operated, and provides separate controls for clamping the sample and for regulating the penetrating pressure. Penetrating pressures can be applied up to 150,000 pounds, while clamping pressures are provided up to 100,000 pounds. Equipped with a set of three dies for use with different gauges of metal, the machine will test material up to ¼" in thickness.

Although the conventional ⅞" diameter penetrator used in most ducility testing machines satisfactorily determines the ductility of steel, it was felt that cup testing over a larger area would afford a greater opportunity of detecting surface and sub-surface imperfections. A short ⅞" diameter extension on top of the 5" diameter penetrator affords an opportunity for comparison with the ⅞" standard method. To aid in the evaluation of results, the area involved in the test is inscribed with a 1" grid which can be correlated to the grid pattern of drawn parts.



"Keep cool everybody! Emil has a grip like a JACOBS CHUCK!"

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JACOBS

IT HOLDS

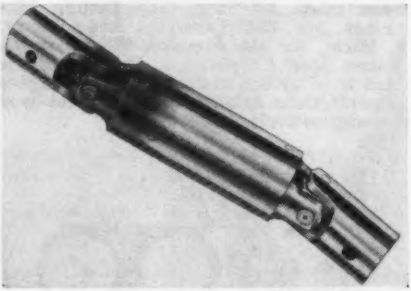
The Jacobs Manufacturing Co., West Hartford 10, Conn.

Curtis Ball Type Universal Joint

The Curtis Universal Joint Co., Inc., Springfield, Mass., has recently announced the development and availability of a new "Ball Type" Universal Joint. This unit is designed for light duty applications, and is available in four sizes: ½"; ¾"; 1"; and 1¼",—either single or double, with solid or bored hubs.

The Curtis new 'Ball Type" joint is designed with steel forks bearing upon a bronze ball, with heat-treated centerless ground pivot bearing pins. The large pin is equipped with a Curtis patented oiler with a riveted small pin.

The Curtis Universal Joint Company is exclusively a manufacturer of Universal



Joints—and in addition to supplying industry with standard stock size joints, the firm engineers and develops other than stock sizes in collaboration with industries' specialized requirement.

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Star Boring Tools

Star High Speed Boring Bits are centrifugally cast assuring fine grain structure and greater tensile strength. High tungsten content plus chrome and vanadium hardened to 64 Rockwell impart to this tool a high red hardness, excellent impact value and remarkable compressive strength.
These tools eliminate the necessity of hand grinding tool bits for boring shapes.
Available with ⅜" square shanks and three cutting tip sizes: ⅛", 5/32" and ¼". Overall Length is 2⅝".
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that do a BIG JOB
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LONGER LIFE — FASTER CUTTING STRENGTH
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THE SECRET of their durability and long life lies in our method of grinding which produces a smooth, unbroken cutting edge. No saw tooth edge to load-up and break-down.

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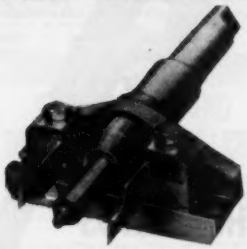
Non-Electric Magnet Scrap Separator

Dings Magnetic Separator Co., 4740 W. Electric Ave., Milwaukee 46, Wis., has announced the development of a non-electric permanent Alnico double drum magnetic separator, for the automatic separation of magnetic and non-magnetic products. This unit is said to be well suited for processing non-ferrous chips and fine borings which contain less than 10% iron contamination.

The separator incorporates two magnetic Perma-Drums, one mounted directly above the other, enclosed in a dust-tight housing. Each drum consists of a stationary non-electric Alnico magnet assembly, around which revolves a non-ribbed armor plate drum shell. The diagram below shows the principle of operation. Non-magnetic material flows over the drum shell in a normal trajectory. Magnetics are held fast to the surface of the shell for one half revolution until they are carried to a point beyond the magnetic field, to be separately discharged.

As the material is spouted from the first to the second drum, it is "turned over", so that a more effective secondary separation takes place. This is particularly helpful on borings and turnings where

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Finished holes 1½" to 11¾" diameter to a depth of 8" in one rapid operation on your present equipment

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THE BOREMASTER

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CAMS

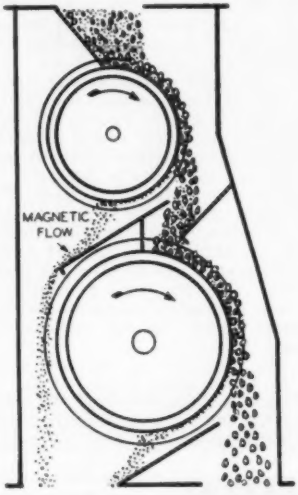
A **complete** cam cutting service for both large and small cams is offered by our **ROWBOTTOM** and **DALY** cam milling facilities.

May we quote **YOU?**

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119-02 15th Ave. College Point, L.I., N.Y.

the iron contamination may be inbedded in the curls.

The complete unit is available in nine different sizes covering most applications. A 25" unit, for example, with a capacity of from 2000 to 4000 lbs. per hour de-



pending upon the nature of the scrap, includes: an 18"x25" PA Perma-Drum; a 24"x25" PA Perma-Drum; a dust-tight housing common to upper and lower drum; a common motor drive (see diagram); and a reciprocating feeder with individual motor drive.

The magnetic permanence of the magnets are guaranteed to last the life of the installation. The magnetic strength of each magnet has been measured with a gauss meter and is recorded on the shipping tag.

FOR PEAK PRODUCTION ON A WIDE RANGE OF WORK

HYPNEUMAT

POWERFUL—AUTOMATIC DRILLING and TAPPING UNIT

Immediate Delivery

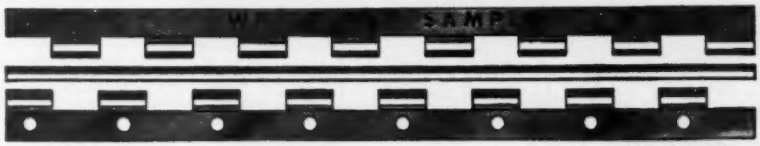
- 3½" Stroke
- Drilling Capacity ⅜" in steel
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⅝" KNUCKLES. 19, 18 & 16 GA.
UP TO 3" OPEN WIDTH.
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WITH OR WITHOUT HOLES.
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S & S HINGE AND METAL PRODUCTS CO.
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Produce your small precision parts with well-known "DERBYSHIRE" accuracy

Illustrated:

The DERBYSHIRE ELECT lathe with 18" bed; ball-bearing headstock with collet closer attachment; double compound rack-and-pinion slide rest with front tool post slide graduated to swivel 360°; six-position turret to take standard tools.

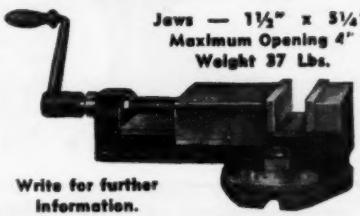
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NEW BRITAIN

SWIVEL VISE

Jaws — 1½" x 3¼"
Maximum Opening 4"
Weight 37 Lbs.



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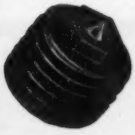
The body is made of semi-steel; the jaws of tool steel hardened and ground. All working surfaces are ground. The vise is as accurate as is possible and the degrees are cut to very close limits.

NEW BRITAIN TOOL & MFG. CO.
NEW BRITAIN, CONN., U. S. A.



A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.



The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in $\frac{3}{16}$" to 1" diameters. *Send for price list.*

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Beverly THROATLESS SHEAR

Cut any Shape... STRAIGHT OR IRREGULAR



B-3 with Ball Bearing Hold Down

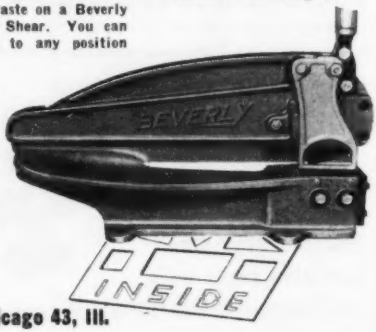
Make any cut—curved, straight or irregular, faster, easier and better with less material waste on a Beverly Throatless Shear. You can turn work to any position and make a clean cut as you go. Handles heavy gauges with ease—lighter metals without distortion. 4 models — capacities 18 gauge to 3/16" mild. All Shears equipped with H.C. H.C. Blades for cutting Stainless.

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8" Reach — 16 ga. cap.

Makes inside slotting cutting faster, easier, cleaner. Punch and die arrangement of 5 blades assures accuracy, clean cutting action. Cuts 2½"x$\frac{1}{16}$" slot at one stroke. Throat design permits pivoting work at any point in stroke for special inside cuts. Note sample cuts at left.

See your Beverly Dealer or write for illustrated catalog.



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On this typical valve guide bushing, one man reamed 10,000 pieces per day, manually. Over 374,220 pieces were reamed per grind, with the reamer revolving at 1200 R.P.M.

Actual production reports demonstrate the superior quality of WILLEY'S METAL.

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WILLEY'S CARBIDE TOOL CO.

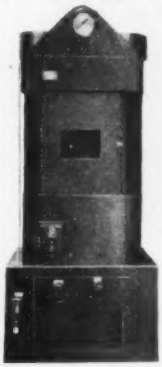
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1,000 TON PRESS

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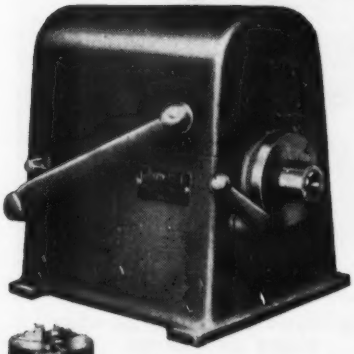
3. **ENGINEERED** Built to exacting specifications, M & N presses perform like precision instruments. Quick, easy response — accurately — means **instant** hobbing action.

4. **PRODUCTIVE** Press illustrated: 21" diameter ram has a 4½" stroke; each of 4 columns is 5¾" diameter; opening is 14" high, 17" from left to right and 30" from front to rear; press is operated by 3 hp motor.

Made by Specialists in Hydraulic Hobbing Presses.

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SPEED UP FINAL OPERATIONS ON DIES • GEARS • SCREWS • LONG RODS

A recent addition to the COLBORNE line of Speed Lathes is the Series 30 machine. This speed lathe is indispensable for economical polishing, grinding, burring and lapping.

Very compactly constructed to do highest quality work with the COLBORNE features of spindle bearings running in oil, instant stopping brake, easy opening collet and standard speeds of 600-920-1720-3280-4800 RPM using ¾ H.P. motor and cone pulleys. Collets and chuck may be used.

For more production per day choose COLBORNE.

COLBORNE MFG. COMPANY
BUILDERS SINCE 1879
157 DIVISION ST. CHICAGO 10, ILL.

Kent 2-Spindle Bolt Threader

A new dual-spindle Bolt Threading Machine designed for the rapid threading of screw blanks and other milled, upset or forged parts which have regular or irregular heads, has been introduced by The Kent Machine Co., Cuyahoga Falls, Ohio. Either right or left hand threads can be cut by reversing motor, when so ordered.

The simplicity of this new unit requires a minimum of operating skill, according to its manufacturers. The machine promotes continuous threading on long production runs. Change-overs from one job to another can be quickly accomplished. The threading capacity of the unit on straight threads is 1″ diameter; capacity on pipe threads is ¾″ taper pipe. The longest blank which can be threaded on the Kent machine is 24″; the longest thread cut is 6″.

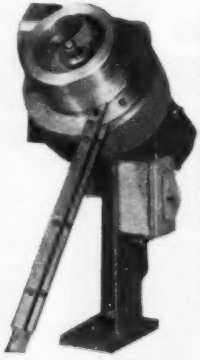


Parallel to the threading spindles are two anti-friction slides, carrying work holders which are designed to suit the work being threaded. Ball bushings are used in the slides to reduce drag, resulting in greater thread accuracy without the need of resorting to a lead screw. The blanks are placed in the work holders and advanced to the dies by hand wheels. When the die begins to cut, forward pressure on the wheel is removed, and the work advances by lead of the thread itself. Alternate feeding to the two spindles results in high production, the manufac-

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Eliminate costly handling operations by delivering part automatically to work position. Parts poured into the motorized hopper are arranged and fed as required.

Several types available suitable for feeding a wide variety of parts.

Send sample of part to be fed when writing for quotation.

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turers state, without crowding the operator.

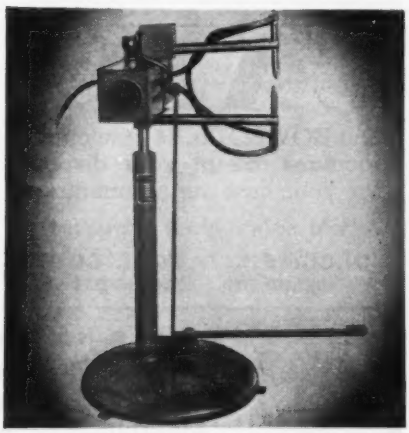
When the proper length of thread is cut, an adjustable stop engages a fork which is fitted into the spool of the die, and trips it automatically. The backward movement of the wheel for extracting threaded pieces and loading blanks automatically closes the die for the next cutting.

The spindles are driven through V-belts and change gears from a 2 h.p., 1200 r.p.m. motor located in the base of the machine. The height of the unit is 41½", the length is 43", and the width is 28"; net weight is 1025 lbs.

Pedestal Rocker Arm Welder

A new and simple spot welder for general use has been announced by Universal Welder Corporation, 772 Carnegie Ave., Cleveland 15, Ohio. The welder is of the rocker arm type, with reversible arms for vertical and slant electrode holder mounting.

The unit pictured below is rated 5 KVA, 220 volt, 60 cycle (50% duty cycle), in accord with RWMA practices and can make welds in sheets from 2 No. 28 gauge to 2 No. 20 gauge steel. Throat depth may



be varied from 3" to 15" by adjusting the arm length. Arm spacing may be adjusted also and the arms can be swivelled to get into unusual places. The welder is available with both air cooled and water cooled point holders. The new unit is rugged, fool-proof and economical in operating cost. Electronic timers are available for the welder if desired.

WOULD YOU BUY AN IMITATION DIAMOND?

We don't believe you would

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QUICK-LOADING STOCK REELS

The S and S stock reels with quick loading arms are designed for the economical handling of stock from coils. Constructed with a snap lock knuckle joint for loading. These reels may be set in any plane from vertical to horizontal. Double swivel reels are manufactured so that loading is possible while other spool is reeling out stock.



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S&S MACHINE WORKS
4539 W. Lake St., Chicago, Ill.

KING PORTABLE BRINELL

for all HARDNESS TESTING, Throat 4", Gap 10", Wt. 27 lbs. — ACCURATE

Puts actual load of 3000 KG on 10 mm. ball.

Test head removable for testing very large parts.



ANDREW KING

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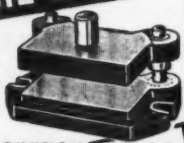
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Precision-Bored on Master Plates



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Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.



Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

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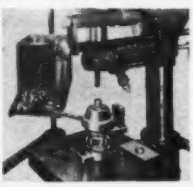
JIFFY JIG

The fast, accurate, low cost collet type work holder speeds secondary operation drilling, milling, tapping, etc., either horizontal or vertical.

Guide bushing support (not shown) for cross hole drilling.

Spring Ejector (optional) speeds work. Simple, dependable, proven in service.

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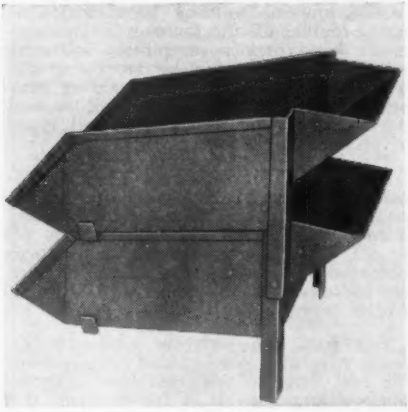


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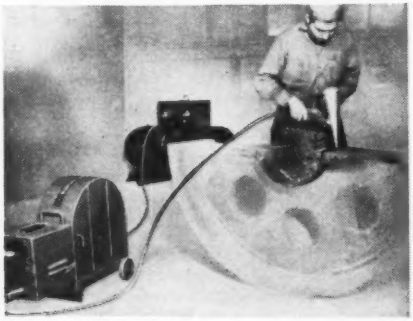
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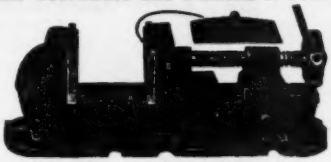
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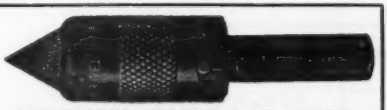


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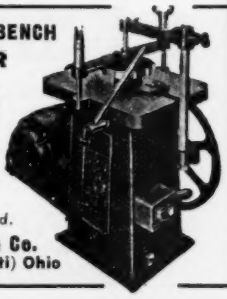
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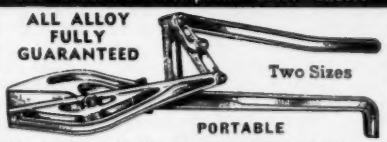
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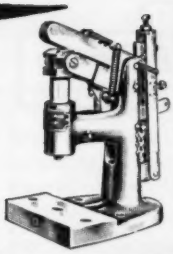
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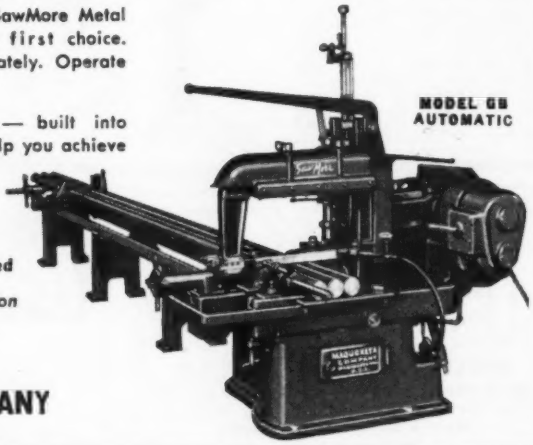
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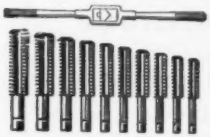


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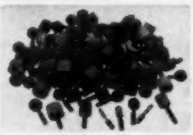
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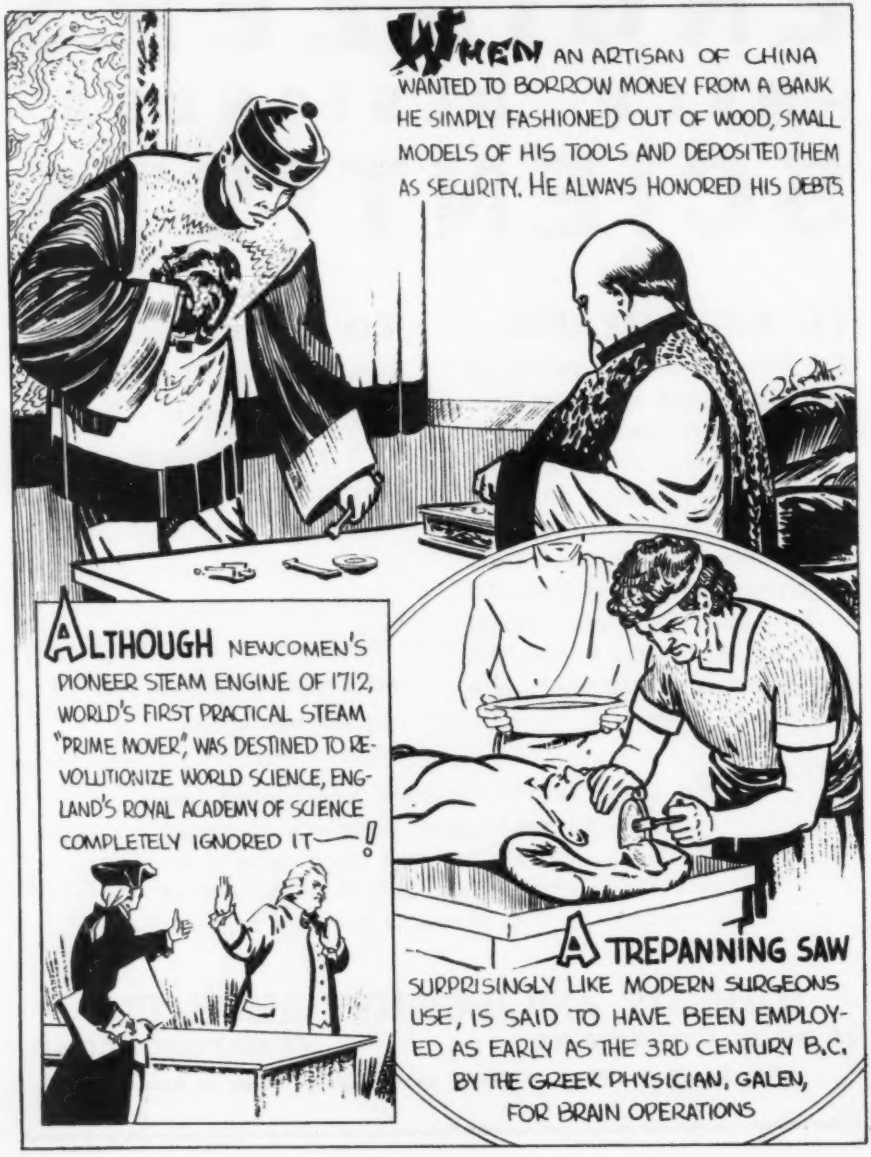
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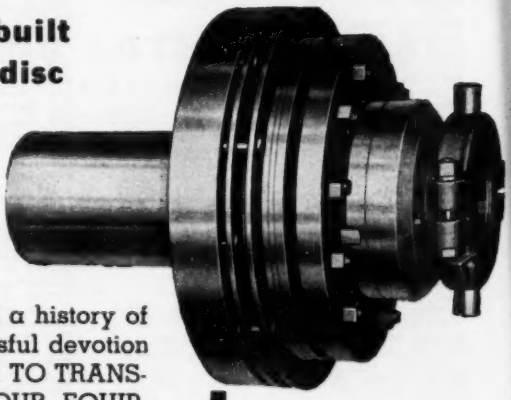
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2	.75 "	2.25 "	4.00 "
3	1.25 "	3.25 "	6.00 "
4	1.75 "	4.25 "	10.00 "
5	3.50 "	8.25 "	14.00 "

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5/32"	1.10	9/16"	2.30	31/32"	4.40
3/16"	1.10	19/32"	2.55	1"	4.40
7/32"	1.35	5/8"	2.55	1-1/16"	4.95
1/4"	1.35	21/32"	2.75	1-1/8"	5.60
9/32"	1.45	11/16"	2.75	1-3/16"	6.10
5/16"	1.45	23/32"	3.00	1-1/4"	6.80
11/32"	1.65	3/4"	3.00	1-5/16"	7.50
3/8"	1.65	25/32"	3.20	1-3/8"	8.30
13/32"	1.90	13/16"	3.20	1-7/16"	9.10
7/16"	1.90	27/32"	3.55	1-1/2"	9.90
15/32"	2.10	7/8"	3.55		
1/2"	2.10	29/32"	3.95		

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CANAL 6-5575

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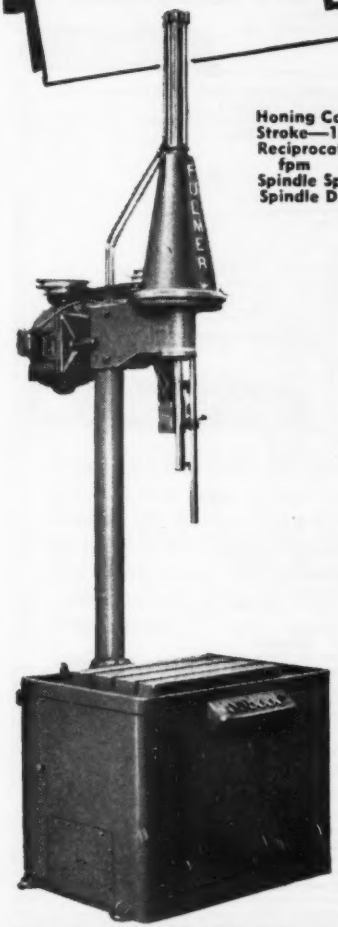
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NEW SMALL HONING MACHINE by FULMER



Major Specifications

Honing Capacity—¼" to over 4"
Stroke—15" maximum
Reciprocating speeds—1 to 70 fpm
Spindle Speeds—3
Spindle Drive Motor—3 HP
Hydraulic Pump Motor—2 HP
Hydraulic Oil Capacity—25 gal.
Coolant Capacity—45 gal.
Spindle Diameter—1¼"
Vickers Hydraulic System

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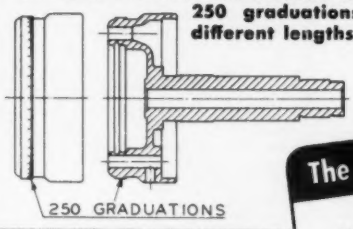
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The job:

Graduate this 5¼" diam. handwheel with 250 graduations of 2 different lengths.



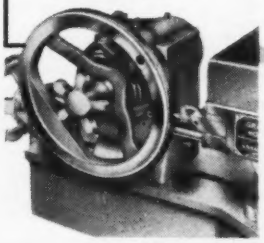
Here's a typical case of the Model GC Dial Graduating Machine in action.

The old way:

Floor to floor time per piece: 45 mins. using milling machine, index head on table, and lathe tool on the arbor.

The MODEL GC way:

Floor to floor time per piece: 1¾ mins. 25 pieces are now completed on Model GC in the time it took to graduate one the old way. Machine paid for itself after 317 pieces were graduated — after only 10½ hrs. *production time!*



If dial graduating is a problem in your shop, Model GC is the machine for you. It cuts any number of graduations from 40 to 1,000 on handwheels, dials etc. from 1½" to 20" diam. It's fast, accurate, adaptable—and it's available for prompt delivery. Send for complete details today. ABRASIVE MACHINE TOOL CO., 14 DUNELLEN ROAD, EAST PROVIDENCE 14, RHODE ISLAND. Distributors Throughout the World.

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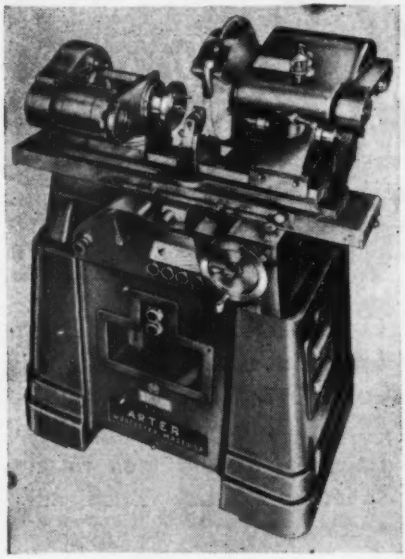
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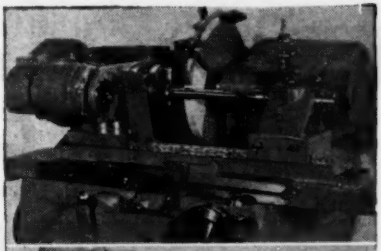
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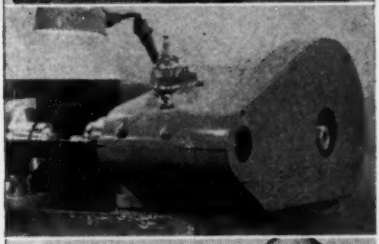
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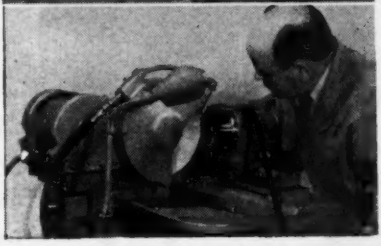
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MODEL No. 103

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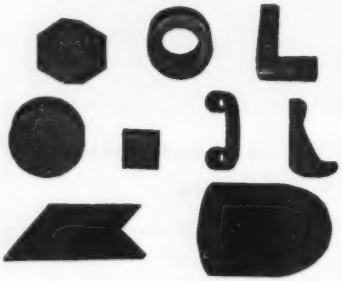
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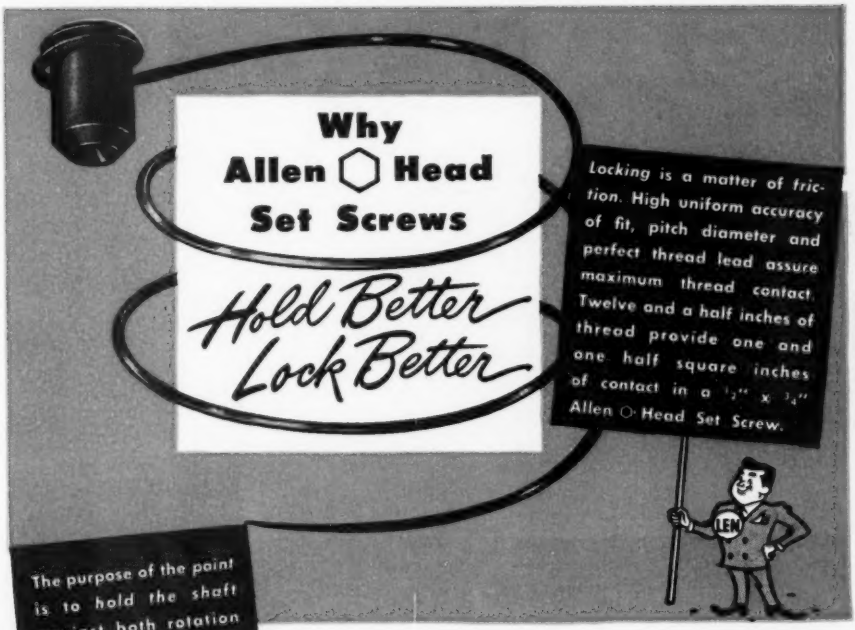
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